SIEMENS

MAMMOMAT Novation

SP

Troubleshooting Guide

System

Mammomat Novation DR

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Protective measures

System power supply

Before you begin working on equipment, it is very important that you disconnect it from the power supply at the main circuit breaker. Before removing or inserting any of the printed circuit boards, switch off the equipment.

⚠WARNING

If the system is only switched off at the control panel, the line voltage will still be present at the generator line connection (see wiring diagram).

➪ A life-threatening hazard of electric shock exists.

⚠WARNING

After the system shuts down, there may still be 380 V DC present on the intermediate circuit.

➪ A life-threatening hazard of electric shock exists

Printed circuit boards

⚠CAUTION

The printed circuit boards contain highly electrostatically-sensitive components.

If disregarded, the components could be damaged.

➪ Use ESD equipment, ground prior to making contact, and place the components on a conductive surface.

Measurements with the oscilloscope

⚠WARNING

Under no circumstances should the existing ground conductor in the mains cable be disconnected when operating the oscilloscope.

There is a life-threatening hazard of electric shock.

➪ For measurements in which a resulting ground loop may affect the measuring result, use the differential amplifier (difference measurement).

Error messages of the master Err 0XX

A malfunction detected by the system is indicated by " Err" followed by a three-digit error code on the kV and mAs displays of the control panel. This can be acknowledged by the operator pressing the limit button. Exceeded limits are also deleted with the limit button.

Err 004

“Communication master - AEC disturbed or AEC not ready”

Description

If the master processor (D750) can no longer activate the AEC processor via the serial interface or if any important data from the control deck is missing, the above error message is displayed.

Fault elimination

First check if PC board D750 is plugged in correctly and if the connections to the power supply and the serial interface (see wiring diagram) are functioning correctly.

If no fault can be found, PC board D750 should be replaced.

Err 005

“Flash in AEC is defective or not correctly initiated”

Description

During initialization, the AEC processor (D750) checks the data stored in its E^2PROM by means of stored checksums. If this data is incorrect or if the E^2PROM fails, the AEC processor informs the master processor via the serial interface and the above error message is displayed.

The master also generates this error if communication has not been established with the AEC during exposure release.

NOTE	**In contrast, error 004 appears if communication started with the master disturbed.**

Fault elimination

Reprogram E2PROM or replace E2PROM or PC board D750. Reprogram using the service PC "Backup" menu.

Err 008

“Communication master - stand disturbed or stand not ready”

Description

This error means that communication between the master processor and unit processor via the serial interface is faulty or interrupted.

Fault elimination

Check whether the power supply and the serial interface (see wiring diagram) to the unit are functioning correctly.

Err 011

“Exposure aborted by user”

Description

If the exposure buttons are released prematurely, exposure is aborted immediately. On the control deck, the LIMIT LED (→0←) lights up, an acoustic signal sounds and the above error message is displayed.

Fault elimination

This error indication is purely informational and does not require further action. Should it appear frequently, however, check the contacts of the exposure release buttons. Replace the exposure release button(s), if necessary.

Err 012

“Time limit reached”

Description

In order to prevent the tube assembly from overloading, a timer runs during exposure. This is set to the time limit prior to exposure. If this timer runs down, the exposure is aborted immediately, and the above error message is displayed. Depending on the mode of operation, the time limit is calculated as follows:

AEC mode

The time limit is the power-dependent load time plus a tolerance value (approx. 400 ms).

mAs mode

The time limit is the calculated exposure time plus a certain reserve. If this period is shorter than 2 s, 2 s are assumed. If it exceeds 2 s, a reserve time of 400 ms is added.

The time limit can be read off in ms with the service PC in “normal mode” under item “AEC data”. The value shown here does not include the extra 400 ms.

Fault elimination

The tube current and the filament current must be measured again with the oscilloscope (test points MA_ACT and FIL_CURR_ACT on D750). The nominal and actual value of the tube current can be read off with the service PC in normal mode. If the actual tube current is too low, you must first ensure that the dynamic learn filament current (DLF switch) is switched on. The tube must be readjusted in any case. Should difficulties still occur, the tube current actual value acquisition must be checked (see wiring diagram).

Err 013

“mAs limit reached in AEC exposure”

Description

For safety reasons, the accumulated mAs is integrated via the timer independently of the AEC during AEC exposures. If a focus, tube assembly and kV-dependent time limit (see table) is obtained without the AEC being switched off, the exposure is aborted and the above error message is displayed.

Tube assembly	25 kV	30 kV	35 kV
P40 MoW-100G F1	196 mAs	163 mAs	140 mAs
P40 MoW-100G F2	600 mAs	500 mAs	428 mAs
P40 MoW-100G F3	238 mAs	198 mAs	170 mAs
P40 MoW-100G F4	752 mAs	627 mAs	537 mAs

Fault elimination

The dose signal from the detector or the chamber to the hardware of the AEC (see wiring diagram) must be checked.

If no error can be detected, PC board D750 or D801 must be replaced.

Err 014

“kV, corrected for dose calculation, is out of range”

Description

The kV value used for glandular dose calculations is the "set kV" adjusted for the actual HVL value of the tube. This corrected kV value is outside the limits of the lookup tables used for glandular dose calculations.

Fault elimination

Reload the tube-specific HVL values using the "dose calculation configuration program".

Err 020

“PC message had bad length”

Description

The length of the message sent from the service PC to the MAMMOMAT Novation^{DR} is too long.

Fault elimination

Check that the correct version of the service program is being used.

Err 022

“**Receive message from external unit failed**”

Description

An error occurred when the MAMMOMAT Novation^{DR} was receiving data from the PC or printer.

NOTE	**May occur if the printer is switched on/off while the rest of the system is on.**

Fault elimination

Check the cables and connectors to the PC or printer. Board 750 defective. PC/printer defective.

Err 024

"PC, ID camera or workstation has not sent ACK/NAK within two seconds. Three tries are made"

Description

The service PC did not answer.

Fault elimination

Check the cables and connectors to the PC. PC defective.

Err 025

"PC, ID camera or workstation sends NAK three times as response to one and the same message"

Description

The service PC did not receive information from the master. Timeout occurred and the service PC responds with NAK.

Fault elimination

1. Reset error on panel and try again.
2. Reset MAMMOMAT Novation^{DR} and PC.

Err 030

"Master PLD requests interruption of tube voltage"

Description

The master PLD logic has detected a type of error that is considered fatal and must terminate the exposure.

Fault elimination

1. Reset error on panel and try again.

Err 040

"The radiation protection door is open"

Description

The radiation protection door switch is not active while exposure is being released.

Fault elimination

1. Check the door switch.

Error messages of the panel Err 1XX

Err 105

“Checksum error in installation data stored in panel EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the installation area in the E^2PROM on the control deck is checked with a shadow area also stored in the E^2PROM. If any discrepancy is detected, the above error message is displayed.

Fault elimination

The installation data can be corrected via the service PC. If this error appears more frequently, exchange the deck PC board D740 and reinstall the parameters in the control panel; see Service SW Backup/Restore. The opdose parameters have to be programmed manually via the control deck. For the remaining parameters, use the service PC "Backup" menu.

Err 106

“E^2PROM program area error”

Description

When data is stored in the E^2PROM of the control panel during programming of the opdose parameters, this is read back once more to check whether it has been stored correctly. If any differences occur, the above error message is displayed.

Fault elimination

The E^2PROM in the panel must be replaced. If the error still occurs, the whole D740 must be replaced. In both cases the parameters in the control panel have to be reinstalled. The opdose parameters have to be programmed manually via the control deck. For the remaining parameters, use the service PC, backup menu.

Err 107

“No communication panel - master”

Description

If no data transmission takes place between the deck and the master during the first 20 s after power on, the control deck switches to the so-called “standalone” mode. The keyboard can be operated normally. If the exposure release button is operated in this mode, the above error message is displayed.

Fault elimination

The cause of this error can be an interruption on the serial interface to the master. For this reason, this connection must be checked carefully.

Err 121

“The version number of EEPROM and PROM are not the same”

Description

This error applies to the panel.

Fault elimination

Check EEPROM and PROM.

Error messages of the filament Err 3XX

Err 303

“Filament current outside limits”

Description

During “Stand-by”, the master checks whether there is any filament current. If the filament current is not within 10% from nominal of a predetermined value, the above error message is displayed.

Fault elimination

Check fuse F2 (see wiring diagram).

Check filament wires.

Filament of tube assembly defective.

PC board D750 defective.

Err 304

“Filament current over limit”

Description

During “Stand-by”, the master checks whether there is any filament current. If the filament current does not reach a predetermined value or the filament current exceeds 8.5 A, the above error message is displayed.

Fault elimination

Check fuse F2 (see wiring diagram).

Check filament wires.

Filament of tube assembly defective.

PC board D750 defective.

Error messages of the AEC Err 4XX

Err 401

“Error during configuration of PLD.”

Description

Configuration of PLD device in AEC failed.

Fault elimination

Check whether Proms are inserted properly

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 402

“Self-test of PLD failed.”

Description

Gain test of circuit board D750 failed.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 403

“Self-test timeout. Fatal error in PLD’s internal program.”

Description

Timeout occurred in the PLD device in the AEC during gain test of circuit board D750.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Turn on the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 404

“AEC CPU requests interruption of tube voltage”

Description

The processor in the AEC part of the master board requests termination of high voltage generation.

Fault elimination

Check the tube power module and the HV inverter module.

Err 405

“AEC PLD cannot perform requested operation because it is busy self- testing”

The PLD in the AEC part of the master board requests termination of high voltage generation.

Fault elimination

Check the tube power module and the HV inverter module.

Err 406

“PLD cannot perform requested operation because it is busy self-testing.”

Description

The PLD in the AEC cannot perform requested operation because it is performing a self-test.

Fault elimination

Acknowledge the displayed error and wait approx. one minute.

Err 407

“Time-out error while erasing AEC flash memory”

Description

The D750 contains a memory device called “flash memory”. This memory is used for storing AEC parameters and correction tables. Before writing data into the memory, it is necessary to erase the sector in which data is to be stored. The erasing procedure is controlled by a timer. If anything goes wrong while erasing the AEC flash memory and a timeout occurs, an error results.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 408

“Time-out error while writing to AEC flash memory (time-out in waiting for ok indication)”

Description

The D750 contains a memory device called “flash memory”. This memory is used for storing AEC parameters and correction tables. The procedure of writing this data is controlled by a timer. If anything goes wrong while writing to the AEC flash memory and a timeout occurs, an error results.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 409

“AEC flash test has locked up (time-out of 15 seconds exceeded)”

Description

During start-up of the unit, the AEC performs a number of tests, e.g. testing of the flash memory device on D750. This testing is controlled by a timer and if something is wrong, a timeout occurs.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 410

"Attempt to start an exposure before AEC flash memory has delivered correction values"

Description

Before an AEC exposure is released and based on the exposure settings on the panel, the AEC fetches an estimated dose from a correction table stored in the flash memory. If the exposure buttons are pressed during a reading operation from the flash memory, an error occurs.

Fault elimination

Acknowledge the displayed error. Wait 15 seconds. Try to perform an exposure.

Err 412

"Attempt made to start an exposure while self-testing of the PLD in AEC was in progress"

Description

Attempt made to start an exposure while a self-test of the PLD in the AEC was in progress.

Fault elimination

Acknowledge the displayed error. Wait 15 seconds. Try to perform an exposure.

Err 413

"Exposure too short, correction value could not be loaded in time"

Description

An estimated dose is calculated before an exposure is released. The minimum estimated dose is defined for a minimum object thickness. For a normal object thickness (> 5 mm), the AEC will calculate a necessary correction value to add to the estimated dose during exposure. This procedure takes a while, and in the case of particularly thin objects, the AEC may not be able to determine within the time limit whether a correction is necessary. An error results due to the small object thickness.

Fault elimination

Acknowledge the displayed error. Change the exposure parameters (e.g. lower kV).

Err 414

"Attempt to release an exposure after the PLD in AEC has failed self-test/ configuration"

Description

Caused by previously generated errors 401, 402, 403, 409 and not restarting MAMMOMAT Novation^{DR}.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 416

“Estimated dose out of range”

Description

Estimated dose out of range, which can be caused by

- an extreme sensitivity setting
- an extreme sensitivity correction setting
- an extreme density correction setting.

This means that the exposure will be terminated by the max. mAs limit.

Fault elimination

Acknowledge the displayed error. Make sure that the correct AEC correction tables are installed. Check settings for sensitivity, sensitivity correction and density correction.

Err 418

“Attempt to make offset compensation test while in AEC mode”

Description

During an offset compensation test, the AEC board is set to a special test mode and cannot perform an AEC exposure. Because of this, test exposures have to be performed in the mAs mode during this test.

Fault elimination

Acknowledge the displayed error. Change to mAs and follow the instructions for an offset compensation test.

Err 419

“Attempt to write to registers of PLD not available during exposure”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel.

Fault elimination

If this error is discovered when reading the error buffer via the service PC, please report it immediately.

Err 420

“Dose or time monitor overflow in PLD”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel. The time and dose values reported by the service PC are not valid.

Fault elimination

If this error is discovered when reading the error buffer via the service PC, please report it immediately.

Err 421

“Wrong test mode request received by PLD”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel.

Fault elimination

If this error is discovered when reading the error buffer via the service PC, please report it immediately.

Err 422

“Attempt to read registers of PLD not available during exposure”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel.

Fault elimination

If this error is discovered when reading the error buffer via the service PC, please report it immediately.

Err 423

“Counters for estimated doses in PLD not initialized in time”

Description

If mAs mode: Internal error that does not interfere with an exposure and is not shown on the control panel. If AEC mode: Internal error that interferes with an exposure and is shown on the control panel.

Fault elimination

If mAs mode: If this error is discovered when reading the error buffer via the service PC, please report it immediately.

If AEC mode: Acknowledge the displayed error. Wait 15 seconds. Try to perform an exposure.

Err 450

“Exposure aborted by dose monitoring”

Description

An AEC exposure could not be performed due to insufficient dose rate.

Fault elimination

Acknowledge the displayed error. Change the exposure parameter settings (e.g. higher kV).

Error messages of the FFDM DR System Er 5XX

Err 501

“DR detector request interruption of tube voltage”

Description

The HW signal DR_DET_RDY_FOR_EXP has become inactive during exposure.

Fault elimination

Check the plugs and connections at board D750.

Err 502

“DR system request interruption of tube voltage”

Description

If the exposure buttons are released prematurely, exposure is aborted immediately.

The HW signal DR_SYST_RDY has become inactive during exposure.

Fault elimination

Check the plugs and connections at board D750.

Err 503

“Master does not sense DR signal level change within specified times”

Description

At exposure start, the HW signal DR_DET_RDY_FOR_EXP is not activated within the specified time.

Fault elimination

Check the plugs and connections at board D750.

Err 504

“Master senses an error within the DR system”

Description

The HW signal DR_DET_ERR has been activated.

Fault elimination

Check the plugs and connections at board D750.

Check the switch S1 on grid drive.

Err 506

“Master senses a tube arc during the AEC pre exposure when in DR mode”

Description

A tube arc has occurred during the AEC pre-exposure. No tube arc is allowed during the AEC pre-exposure.

Fault elimination

N/A

Err 578

“mAs exceeds maximum”

Description

The calculated AEC main exposure mAs value returned from the DR system exceeds the maximum mAs value that the MAMMOMAT Novation^{DR} can handle.

Fault elimination

Check AEC functioning

Err 579

“Master is not updated with the mAs value for the main exposure in AEC mode”

Description

The mAs value for the main exposure has not been calculated/transmitted by the DR system or received by the MAMMOMAT Novation^{DR} within the specified time.

Fault elimination

Check the plugs and connections at board D750.

Error messages of the power pack Err 6XX

Err 601

“Rotation speed not reached within 3s”

Description

During starting of the rotating anode, the master counts the control pulses and compares them with a ‘tube assembly and intermediate circuit voltage’-dependent table value. If this is not reached within 3 s, err 601 is displayed.

Fault elimination

Check oscillation current (see wiring diagram). Rotating anode cable or stator defective.

Err 602

“kV_{min} - minimum tube voltage 17 kV not reached”

Displayed on PC: kV_{min}-minimum tube voltage 17kV not reached

Description

If 17 kV is not reached within 250 ms after the KVE signal, the above error message is displayed.

Fault elimination

Intermediate circuit voltage too low (see wiring diagram).

Tube current or power too high. See also (Tube high voltage, current and mAs values / p. 63)

Check oscillation current (see wiring diagram).

SS relay not pulled up (see wiring diagram).

“kV_{nom}” too low.

Board D750 defective.

Err 603

“kV_{max} - tube voltage greater than 50 kV”

Description

During exposure, a threshold switch in the kV controller monitors whether the high voltage exceeds 50 kV. If this is the case, the exposure is aborted immediately via the KVA lead.

Fault elimination

Check the kV nominal value. Check tube current and power, see also (Tube high voltage, current and mAs values / p. 63). Actual value acquisition defective (see wiring diagram). Replace PC board D750.

Err 604

“WR Austast - inverter short circuit blanking signal remains”

Description

When I_{max} (Overcurrent) in the inverter is exceeded, the control is interrupted for 200 ms. The software then checks whether the blanking signal is still applied. If this is the case, the above error message is displayed.

Fault elimination

Transistor module in HV inverter defective. Check tube current and power, see also (Tube high voltage, current and mAs values / p. 63). Check fuse (F2) . Stator short circuit. Board D750 defective.

Err 606

“Inverter short circuit during radiation”

Description

HV-Inverter overcurrent during exposure sequence.

Fault elimination

Transistor module in HV inverter defective. Check fuse (F2).Check tube current and power, see also (Tube high voltage, current and mAs values / p. 63)

Stator short circuit.

Board D750 defective.

Err 607

“Inverter short circuit during brake cycle”

Description

Actual tube voltage deviates by more than 5% from nominal value at the start of the exposure.

Fault elimination

Transistor module in HV inverter defective. Check fuse (F2).Check tube current and power, see also (Tube high voltage, current and mAs values / p. 63). Stator short circuit.

Err 608

“Tube current is outside limits”

Description

Actual tube current deviates by more than 10% from nominal at the start of exposure.

Fault elimination

Transistor module in HV inverter defective. Check fuse (F2).

Stator short circuit.

Err 611

“KVA signal disabled during radiation”

Description

During exposure, KVA becomes “H” and the inverter is thus enabled. If this enabling fails, the above error message is displayed.

Fault elimination

Check KVA lead (see wiring diagram). Board D750 defective.

Err 620

"U_{anst} +15V to control inverter not present"

Displayed on PC: U_{anst} +15V to control inverter not present

Description

The DC bus voltage used for powering the modules of the generator assembly is too low or too high.

Fault elimination

Check the power supply and fuses.

Err 630

"PH1 pressure switch on the HV tank activated"

Description

the HV actual value does not correspond to the HV set value. The above error message is displayed.

Fault elimination

Overload of the tube assembly or of HV inverter.

Line interruption (see wiring diagram).

Board D750 defective (monitoring).

Err 631

"Open connector in the generator"

Description

At least one connector between modules of the generator assembly or between the master board and the modules of the generator assembly is not connected.

Fault elimination

Line interruption (see wiring diagram).

Board D750 defective (monitoring).

Err 632

"Bias voltage error"

Description

Active bias voltage for large focus or inactive bias voltage for small focus.

Fault elimination

Check power supplies and fuses on D750.

Err 633

“The high voltage is detected during stand by”

Description

If any or both of the signals HV_ON and EN_HV_ON are active during standby (no exposure being performed), this error is issued. Displayed when the tube is arcing.

Fault elimination

Press the "Lim" button to clear the error message.

Check the HV inverter module.

Err 634

“Voltage outside limits for 15V supplies”

Description

This error is issued if the +15V supply voltage goes below 10.6V or if the -15V supply voltage goes above -10.75V.

Fault elimination

Check the power supplies at the mains converter module and the fuses.

Error messages of the OPDIMA Err 7XX

Err 777

“Exposure sequence is aborted by OPDIMA”

Description

The time between pressing acquire from the workstation and releasing the exposure from the MAMMOMAT generator has exceeded 60 seconds.

The selected exposure parameters (kV, mAs) will yield an excessively hard beam quality for the object.

The cancel button was pressed while "Expose at MAMMOMAT" or "Exposure preparation started" was displayed.

Fault elimination

Press the limit button on the MAMMOMAT generator control panel to continue.

Err 778

“No communication present between MAMMOMAT and OPDIMA”

Description

Communication problem.

Fault elimination

Press "Retry" at the workstation or press the limit button on the MAMMOMAT generator control panel to continue. Check the plugs and cables.

Err 779

“The mAs value for main exposure in OPDIMA AEC mode has not been received in time”

Description

Communication problem.

Fault elimination

Press the limit button on the MAMMOMAT generator control panel to continue.

Error messages of the stand Err 8XX

Err 801

“Time out of AR signal”

Description

The grid has not reached its start position within 2 seconds.

Fault elimination

Board D750 defective.

Check grid functioning.

Err 802

“OKT 2 pressure switch on tube housing or beam form anode or door switch”

Description

The oil pressure in the tube has exceeded the limit.

Fault elimination

Allow the tube to cool down. Close door/switches.

Err 803

“Stand requests interruption of tube voltage”

Description

The processor on stand CPU board D801 requests termination of high voltage generation.

Fault elimination

Switch off the equipment and then switch it on again.

Err 811

“Stand not ready for exposure”

Description

Normally, the panel does not allow start of exposure if any of the following errors is present: No object table installed, no film cassette inserted, film cassette not changed after exposure, improper diaphragm mounted. Nor will it allow exposure, if the tube assembly is at a distance from the floor that could result in collision. These operator errors are indicated on the control panel (the LED at the corresponding symbol lights up). Should the control panel nevertheless allow start of exposure, this might be due to a bit error during the transmission of data between the stand and the control panel. As a precautionary measure, the stand also checks whether the conditions are fulfilled. If this is not the case, error message 811 is generated.

Fault elimination

Switch off the equipment and then switch it on again.

Err 812

“Compression protect switch not OK in stand”

Description

This signal is used to check for proper operation of the compression protect relay (Kl) on the motor board (D802). The CPU (D801) reads the signal after a short delay after releasing the compression pedal in order to check that the relay has opened and disabled motor operation in the compression direction. Note that the test point on D802 is protected with 4.75k.

Fault elimination, troubleshooting

Check the fuses on board D802. Normal active level 9V (test point COMP_PROT on D802). If the level is OV check 14V and Kl on the motor board or look for a short circuit on the ribbon cable between D801 and D802. If the cable is OK, D802 should be replaced.

If the voltage is 18V at the test point, the ribbon cable is open or D801 is faulty.

If the voltage is OK, replace D801.

Err 813

“Compression Motor controller, or motor, error in stand”

Description

This signal indicates an overcurrent or lack of voltage (5V or 15V) in the compression motor drive. In the case of an overcurrent, the signal appears after about 2 s and disappears after about 0.5 s. The signal causes D801 to stop sending pulses to the compression drive and thus disables the compression motor. The red LED “comp error”, V2 lights when error (comp_ok signal low) except if 5V is missing. There is no test point.

Fault elimination, troubleshooting

If V2 is lit steadily, check fuses F3 (24V) and F2 (24VF & l5V). l5V is indicated by LED V49 and can be measured at test point l5V on D802. Test point 24VF should measure about 30V in an unloaded state. 5V is indicated by LED V7 and test point 5V on D802. If 5V and 14V (normally about 18V unloaded) are missing, check Fl on D801. Missing voltages can also be caused by an open connection in emergency stop switch S880.

Overcurrent is most likely caused by a faulty motor, mechanical overloading of motorized movement, short-circuited wiring of D805 or a faulty D802.

Err 815

“Compression speed too high, error suspected in stand”

Description

The CPU (D801) has detected a compression speed greater than 13 cm/s. The software causes the compression motor to reverse direction.

Fault elimination, troubleshooting

This error can be caused by play in the compression unit, defective compression measurement hardware, or a short-circuited power stage on the motor board. In the first two cases, replace the compression unit and recalibrate the compression values with the service PC program. In the third case, the compression motor will run at a max. speed upwards except when a compression pedal is pressed. It is not certain that error 815 will appear. Replace D802.

Err 816

“Collimator fails to reach correct position in time”

Description

Time out for filter lamella positioning during startup.

Fault elimination, troubleshooting

Check whether the collimator plates move at all.

If the collimator plates do not move:

- Check whether the CPU is sending out pulses, COLL_ST test point on D801, if not, replace D801.
- Check whether the wing board (D805) is receiving pulses, test point COLL_ST on D805; if not, check the cables and connectors between D801 and D805.
- Check voltages on the wing board.
- Check STEP_ENABLE test point on D805. It should be low (0V) when pulses are output to the motor.

If the collimator plates do move:

- Check whether the collimator position light switch is functioning as in the description above.
- Check whether it moves for the entire 8 s. If it does but apparently does not reach the other position in time, something may be in the way and slowing the speed, or the motor may be faulty. In the latter case, try replacing the motor.
- If the motor stops after just a short time, either the motor or the wing board (D805) is faulty. Try replacing one of them.
- Check collimator calibration (lamp and/or X-ray field).
  If not successful, replace collimator and/or D814.

Err 817

“Filter self-test failure”

Description

The zero position for the filter wheel is not found during start-up.

Fault elimination, troubleshooting

Switch between the three anode/filter combinations on the control panel and check if the filter disk moves.

- Check whether the filter position light switch works.
- If it only moves slowly, something may be in the way and slowing the speed, or the motor may be faulty. In the latter case, try replacing the motor.
- If the motor stops after just a short time, either the motor or the wing board (D805) is faulty. Try replacing one of them.
  If not successful, replace collimator and/or D814.

Err 818

“Filter positioning failure”

Description

The zero position for the filter wheel is not found after exposure.

Fault elimination

Switch between the three anode/filter combinations on the control panel and check if the filter disk moves.

- Check whether the filter position light switch works.
- If it only moves slowly, something may be in the way and slowing the speed, or the motor may be faulty. In the latter case, try replacing the motor.
- If the motor stops after a short time, either the motor or the wing board (D805) is faulty. Try replacing one of them.

  If not successful, replace collimator and/or D814.

Err 819

“Drive protect switch not OK (lift and rotation), in stand”

Description

This signal is used to check for proper operation of the drive protect relay (K6) on the motor board (D802). The CPU (D801) reads the signal after a short delay after releasing the activated lift or rotation button in order to check that the relay has opened and disabled motor operation.

Fault elimination, troubleshooting

Normal active level 5V (test point DRIVE_PROT on D802). If the level is 0V, check 24VF and K3 on the motor board or look for a short circuit on the ribbon cable between D801 and D802. If the cable is OK, D802 should be replaced.

If the voltage is 30V at the test point, the ribbon cable is open or D801 is faulty.

If the voltage is OK, replace D801.

NOTE

There is no error for the lift & rotation drive corresponding to the compression OK error. If this fault occurs, D801 stops sending pulses to D802 and the selected motor stops. The LED V12, DRIVE_ERROR functions in the same manner as COMP_ERROR. Note that the current limit is lower when the lift motor is moving downward. If there are problems with lift or rotation operation indicating an overload, look at the DRIVE_ERROR LED to determine if the motor is overloaded.

Overloading is possible due to improper balancing (adjustment of the spring or improper loading of the lifting carriage) or improper adjustment of the rotation brake. Faulty motor, short-circuited wiring or faulty D802 are other possible causes.

Err 820

“Write/read back failure with EEPROM in stand”

Description

If data is stored in the E^2PROM (D801.I34) stand during adjustment, a check is performed to verify that it has been stored correctly. In the event of differences, the above error message is displayed.

Fault elimination

Repeat the attempt to write in the E^2PROM. If this not does not yield any results, in spite of repeated attempts, board D801 must be replaced. All stand parameters must be reinstalled. Use the service PC to reinstall the stand parameters from floppy or disk.

Err 821

“**Stand EEPROM has wrong version nbr (=old or corrupt)”**

Description

The version number of the PROM stand is also stored in the E^2PROM (D801.I34). When starting up the equipment, the version number stored in the E^2PROM is compared to the version number of the PROM. If they do not correspond, the above error message code is displayed on the control panel. This occurs after changing the software version to indicate that a new version has been installed.

Fault elimination

The version number of the new software is automatically written into the E^2PROM. Switch off the equipment and then switch it on again. The error should not recur.

Err 822

“Grid failed to move properly”

Description

The grid has to move properly from the start. This is supervised by the CPU. The CPU measures the time from start till the grid has reached one of the end positions and then is able to leave it. To check that the grid is functioning properly and does not jam, the time the grid requires to move between the two end positions is also measured the first time. If the time for start or run check exceeds 2 sec., this error appears.

Fault elimination, troubleshooting

Check programming of the grid fast speed (normally 80%) and the grid fast speed time (normally 500 ms).

Check the bucky board. First try another board. Make sure the grid moves freely along its entire travel path in both directions.

Check the output voltage at test point GRID_M on D802. At 80% speed and nominally 30V on 24VF, GRID_M should be 30 - 0.8*30 = 6V during fast grid movement. Check for possible short circuits if the signal remains at about 30V. This voltage goes to the bucky via board D805 and its relay Kl. Test point GRID_SP on D802 is the control signal from D801. It is a 5V, 20 kHz PWM signal. At 80% speed, the signal should be low at about 40 µs and high at about 10 µs per period. Replace D802 if the correct output is not achieved despite proper input, cabling and bucky.

Err 824

“Stand motor voltage drops unnaturally”

Description

The CPU (D801) measures voltage 24VF from the motor board (D802). If this value is below about 16V, this error is reported.

Fault elimination, troubleshooting

Check that the stand has voltage (generator - X14 connected, F4 OK). The stand display should be on.

Check that the emergency stop is not activated and that its wiring is OK.

Check that LED V49, 15V, is lit. If not, check fuses F2 and F3 on D802 in the stand.

Check voltage 24VF (measure with reference to test point 0V on D802).

Check the ribbon cable between D802 and D801.

Replace D801.

Err 825

“One or more potentiometers seem to have lost contact with stand”

Description

The four potentiometers, R803-tube angle, R871-preset angle, R861-preset force and R863-thickness, have their return current through signal pot_return. This is done to assure that no potentiometer is missing or partly disconnected so that it can yield a value leading to improper stand operation. During stand configuration or after replacing a potentiometer or the compression unit, the correct value for the signal potentiometer check must be read and stored in the stand’s E^2PROM with the service PC program. This error is reported if the measured value is more than 32 bits less than the programmed value.

Fault elimination, troubleshooting

Check that all potentiometers are functioning properly. An error can be caused by an open connection, connector or potentiometer. If all four potentiometers are functioning properly, check the programming of the potentiometer check and correct it. The need for such an adjustment may indicate a potentiometer is about to fail.

Err 826

“There is a short circuit somewhere among potentiometers in stand”

Description

The same circuitry as Err 825 is used. In this case the error indicates that the value is more than 32 bits greater than the programmed value.

Fault elimination, troubleshooting

Check the actual and programmed pot. check values with the service PC program. If the value is only slightly too high, check all potentiometers for mechanical damage or sensitivity. A short circuit (pot. or wiring) should yield the max. value for pot_check (3FF).

Err 829

“Collimator motor communication error”

Description

Communication between the stand and collimator control board D814 is erroneous or disrupted.

Fault elimination, troubleshooting

Check cables and plugs. Replace D814.

Err 830

“Filter motor communication error”

Description

Communication between the stand and collimator control board D814 is erroneous or disrupted.

Fault elimination, troubleshooting

Check cables and plugs. Replace D814.

Err 831

“Paddle decoder communication error”

Description

Identification of compression paddle fails.

Fault elimination, troubleshooting

Clean the sensor at the paddle. Check whether the paddle code is working with another paddle.

Err 850

“Write/read back failure for table 1 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR}R is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the stand installation menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 851

“Write/read back failure for table 2 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the calibrate compression menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 852

“Write/read back failure for table 3 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation calibration menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 853

“Write/read back failure for table 4 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation calibration menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 854

“Write/read back failure for table 5 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the lift parameters menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 855

“Write/read back failure for table 6 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the best compression menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 856

“Write/read back failure for table 7 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation parameters menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 857

“Write/read back failure for table 8 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the beam limiting device menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 858

“Write/read back failure for table 9 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation parameters menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 859

“**Write/read back failure for table 10 in stand EEPROM”**

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation calibration menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 860

“Write/read back failure for table 11 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for small focus Mo in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 861

“Write/read back failure for table 12 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for large focus Mo in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 862

“Write/read back failure for table 13 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for small focus W in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 863

“Write/read back failure for table 14 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for large focus W in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 864

“Write/read back failure for table 15 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for the light field focus in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 865

“Write/read back failure for table 16 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for wing differences in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 866

“Write/read back failure for table 17 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for the filter in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 867

“Write/read back failure for table 18 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for the optimum compression function in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

Err 868

“Write/read back failure for table 19 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for the optimum compression function in EEPROM.

Fault elimination

Install all stand parameters using the service PC “Back-up” menu.

General

Some files on Mammomat Novation system contain information about processes on the system. This information could be helpful for determination of failure, detector artifacts, communications problems, blue screen and automatic reboot of the WH AWS.The analysis of the files requires specific knowledge. For this reason, if support is required, the files have to be sent to USC/HSC.

If support by USC/HSC is requested, groups of files have to be sent for explicit analysis:

- **MPxxxx.smj, MPxxxx.map, qualify.log,MPxxxx.cfg and drapi.log:** They are located under WH AWS in folder C:\AWS\drul\data\.
- **Brick files**: These files can be shown by using the **PCMX Web** software.
- Savelog files: a feature on the syngo SW is implemented for extracting the files and burning them onto CD (only as of SW VA11x).
- **Windows Event log**.
- **syngo logs**. They are located under WH AWS in folder C:\AWS\log*.*
- **Dump files** (if available). They are located under WH AWS in folder C:\winnt\ minidump*.dmp.
- **brickspy.tar.gz** file.

SW Version VA10x

These instructions describe extracting log files for WH AWS with SW VA10x.

Copy MPxxxx files (detector files), dump files and syngo logs

These files have to be copied to a defined folder to ensure a correct copy.

Work steps

- The syngo AWS application is running.
- Select **Service** and **Local Service** in the menu bar under **Options**

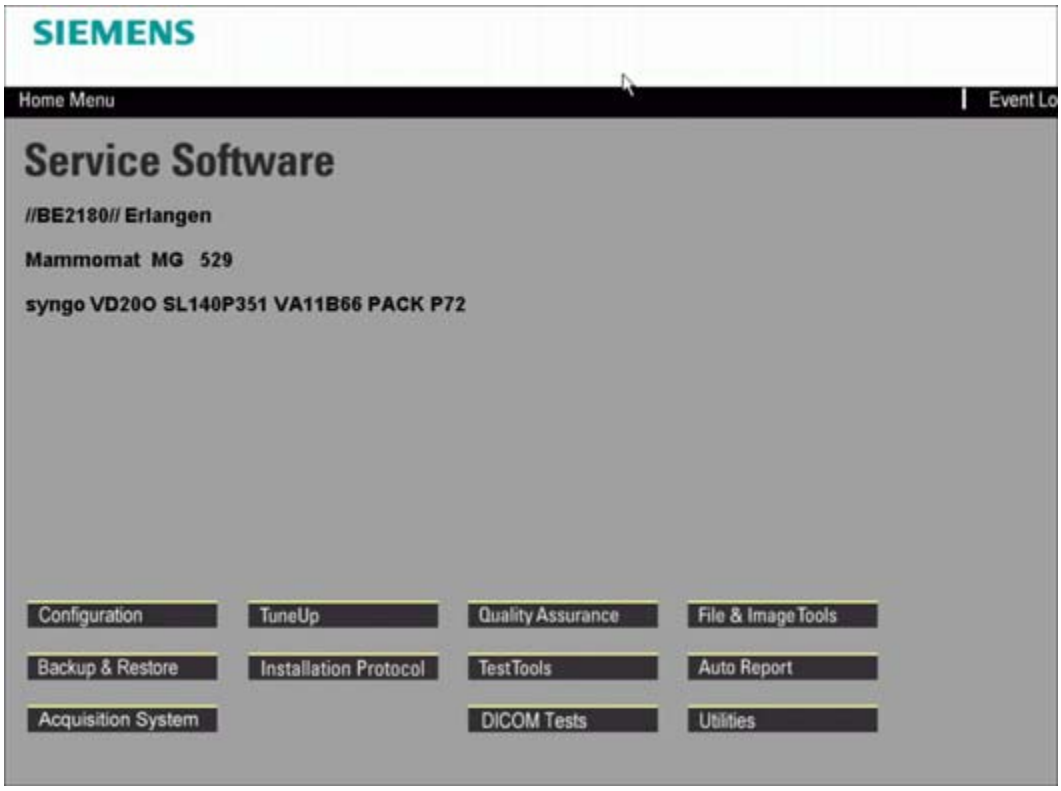


Fig. 1:

- Enter the service key and press **OK**. The Home menu appears.
- Select **Utilities**
- Select **Escape to OS**
- Enter **start explorer** under parameters.

  Command: **NT command Interpreter**

  Parameters: **start explorer**

- Press the enter key.

- Windows Explorer opens.

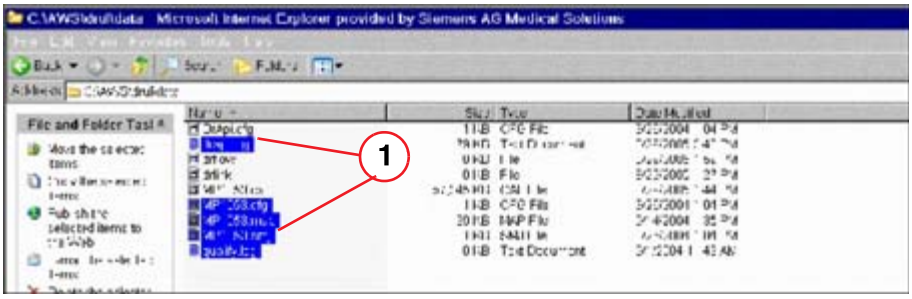


Fig. 2: Detector files

- Under **C:\AWS\drul\data**, select the files **Drapi.log, MPxxxx.cfg, qualify.log, MPxxxx.map** and **MPxxxx.smj**,(1/Fig. 2 / p. 38)click the right mouse button and copy and paste to folder **C:\AWS\Service\extract.**
- Select **C:\winnt\minidump*.dmp** (if available), right-click, and copy and paste to folder **C:\AWS\Service\extract**.
- Under **C:\AWS\log** , select all files (*.*), right-click them and copy and paste them to folder **C:\AWS\Service\extract.**
- Close Explorer.
- Close Explorer.
- Select **Home**
- Close the Service software window

Copy Array and Brick log files

Use the Web Brick window to display these files.

Work steps

Array files

- The syngo AWS application is running.
- Select **Service** and **Local Service** in the menu bar under **Options**
- Enter the service key and press **OK**. The Home menu appears.

- Enter **http:brick** under address**.**

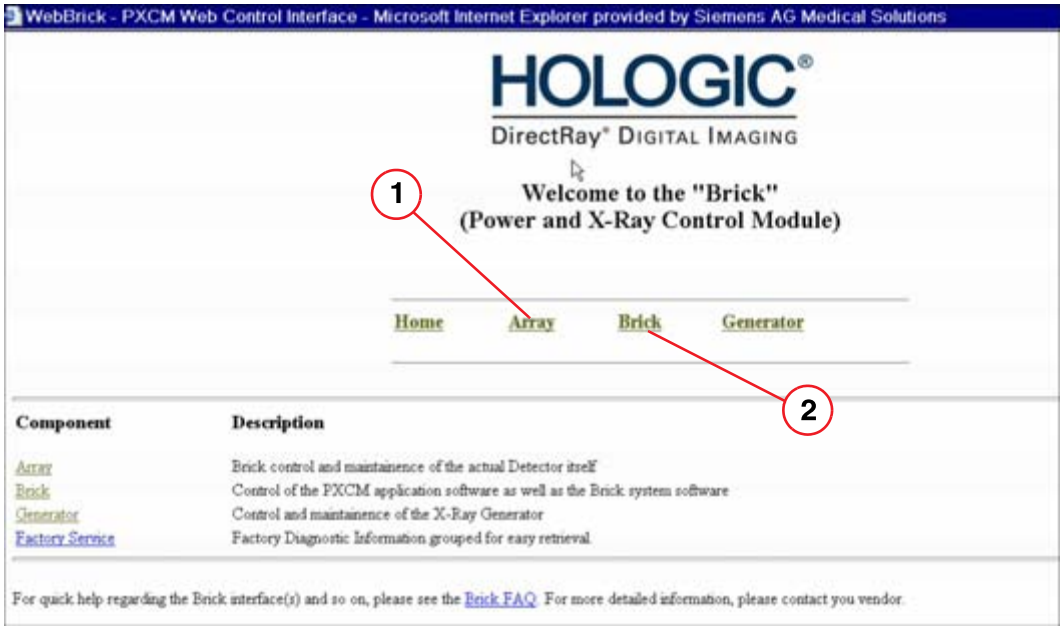


Fig. 3: PXCM Web Control Interface

- Select **array**(1/Fig. 3 / p. 39)
- Select **Log File(s)**

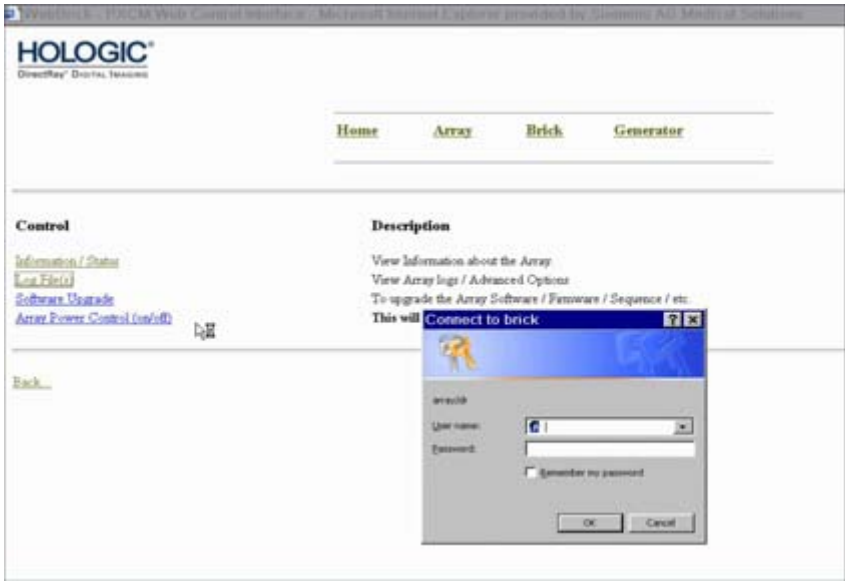


Fig. 4:

- The user name and appropriate password have to be entered (Fig. 4 / p. 39)

  Login: root

  Password: ***

- Press **OK**

- Select **All Log Files**

Fig. 5:

- Right-click **syslog** and select **Save Target As** (Fig. 5 / p. 40)
- Save the file as **array_syslog** in the directory C:\AWS\Service\extract.
- Right-click **syslog.0** and select **Save Target As** .
- Save the file as **array_syslog.0** in the directory C:\AWS\Service\extract.
- **Brick files**
- Select **Brick**(2/Fig. 3 / p. 39)
- Select **Log File(s)**
- Select **All Log Files**
- Right-click **syslog** and select **Save Target As**
- Save the file as **brick_syslog** in the directory C:\AWS\Service\extract.
- Right-click **syslog.0** and select **Save Target As**
- Save the file as **brick_syslog.0** in the directory C:\AWS\Service\extract**.**
- Close the Web Brick window.
- Close the Service software,

Windows Eventlog

Work steps

- The syngo AWS application is running.

- Select **Service** and **Local Service** in the menu bar under **Options**

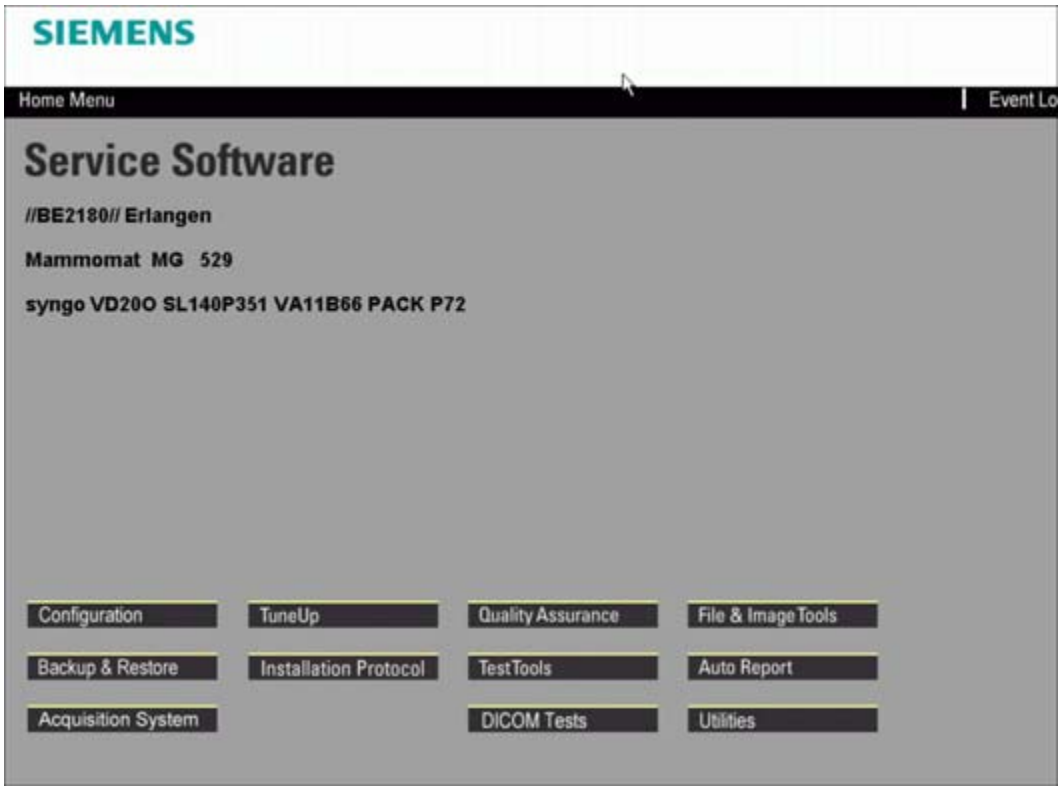


Fig. 6:

- Enter the service key and press **OK**. The Home menu appears.

- Select **EventLog** on the right upper edge of the menu bar.

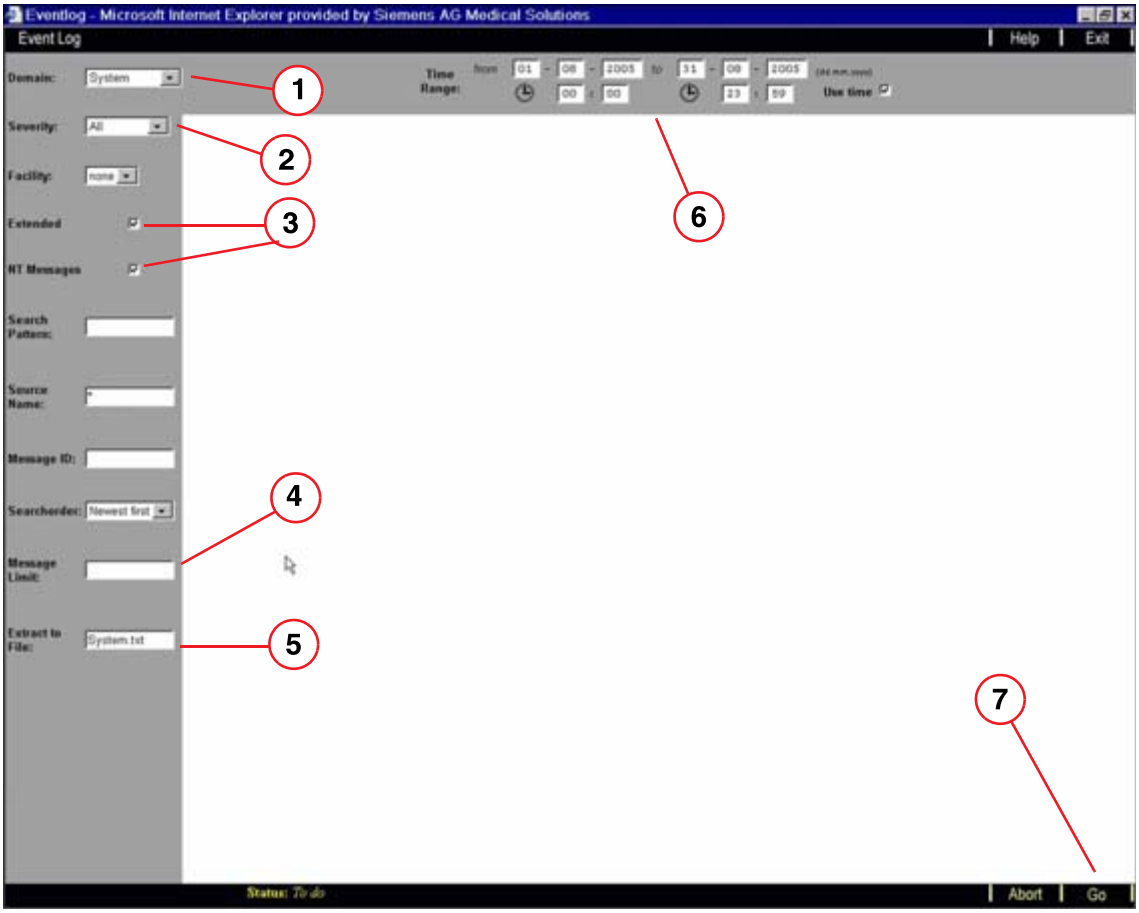


Fig. 7: EventLog_System

- Select the following parameters as shown in (Fig. 7 / p. 42) .

  Domain: **System**(1/Fig. 7 / p. 42)

  Severity: **All**(2/Fig. 7 / p. 42)

  Extended: selected(3/Fig. 7 / p. 42)

  NT-Message: selected(3/Fig. 7 / p. 42)

  Message limit: empty(4/Fig. 7 / p. 42)

  Extract to file: **System.txt** ((5/Fig. 7 / p. 42)

  Time range: last month (e.g.: from dd_mm_yyyy to dd_mm_yyyy (actual date)).(6/Fig. 7 / p. 42)

  Select **GO**.(7/Fig. 7 / p. 42)

- The log file appears.

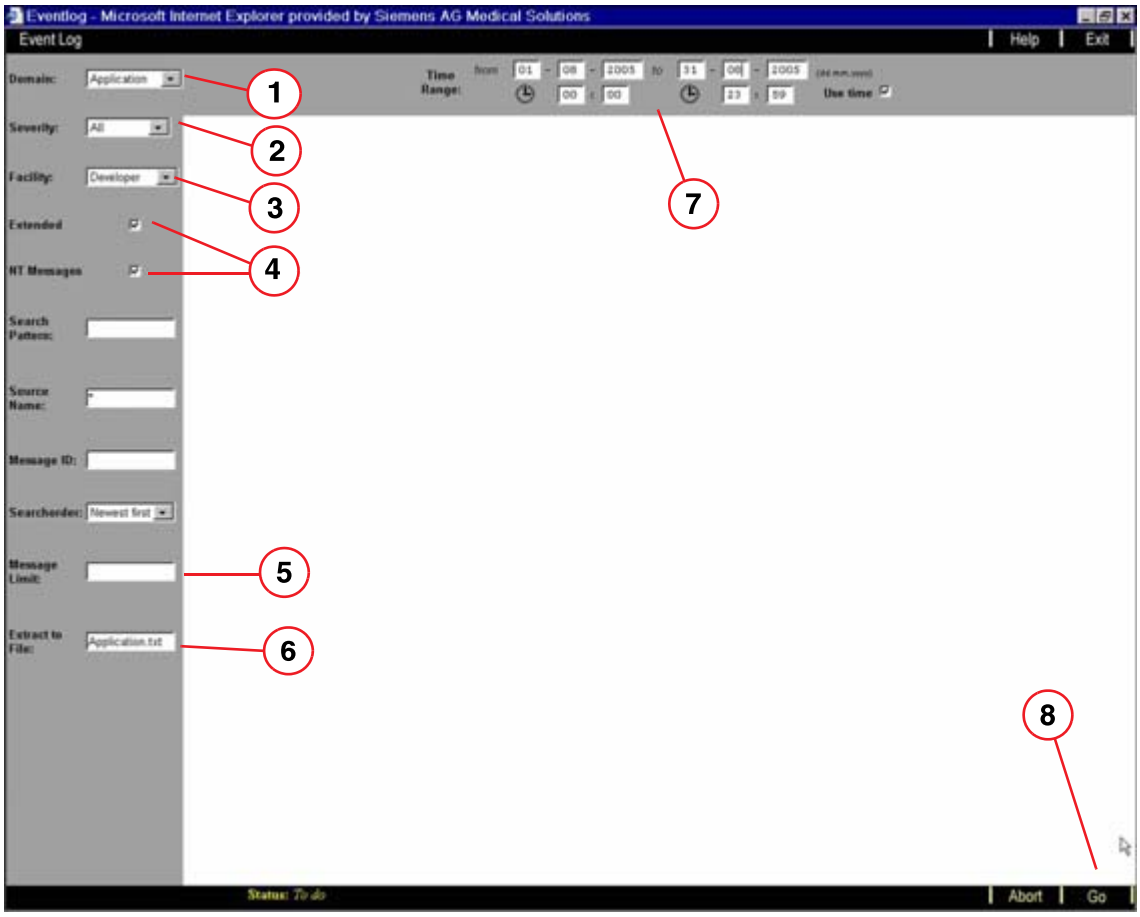


Fig. 8: EventLog_Application

- Select the following parameters as shown in (Fig. 8 / p. 43) .

  Domain: **Application**(1/Fig. 8 / p. 43)

  Severity: **All**(2/Fig. 8 / p. 43)

  Facility: **Developer**(3/Fig. 8 / p. 43)

  Extended: selected(4/Fig. 8 / p. 43)

  NT Message: selected(4/Fig. 8 / p. 43)

  Message limit: empty(5/Fig. 8 / p. 43)

  Extract to file:**Application.txt**(6/Fig. 8 / p. 43)

  Time range: last month (e.g.: from dd_mm_yyyy to dd_mm_yyyy (actual date))(7/Fig. 8 / p. 43)

  Select **GO**.(8/Fig. 8 / p. 43)

- The log file appears.

Brickspy.tar.gz file

Use telnet to start a script.

- Select **Service** and **Local Service** in the menu bar under **Options**
- Select **Utilities**

- Select **Escape to OS**
- Enter **start telnet brick** under parameters

  Login: **root** (and press enter)

  Password: **brick** (and press enter)
- From the brick# command prompt, execute the following command:

  brickspy all (use lowercase letters and press enter)
- Wait until the script is finished and enter **Exit** (and press enter)

Use ftp to get the saved file.

- Select **Service** and **Local Service** in the menu bar under **Options**
- Select **Utilities**
- Select **Escape to OS**
- Enter **start cmd** under parameters
- At the DOS prompt, enter **cd C:\AWS\Service\extract** (and press enter)
- At c:\temp, enter **ftp brick** (and press enter)
- User: **ftp** (and press enter)
- Password: a random e-mail address, e.g.. **test@siemens.com**
- At the ftp prompt, enter **bin** (and press enter)
- Enter **prompt** (and press enter)
- Enter **cd tmp** (and press enter)
- Enter **dir** (and press enter)

  The file **brickspy.tar.gz** will be displayed
- Enter **mget brick*** (and press enter)
- After the file has been transferred, enter **quit** to exit ftp.
- The file brickspy.tar.gz can be found on WH AWS under C:\Temp.

The log files are now stored in the folder **C:\AWS\Service\extract** and can be copied to an external storage medium, e.g., USB stick. If no external drive is available, the log files should be saved to CD. For this procedure, do the following:

Creating a new backup package

- Select Local Service/Configuration/(Backup/Restore)
- Enter a new package name(e.g.:ServiceLogFiles) in the blank line below Package(1/Fig. 9 / p. 45)
- Click add(2/Fig. 9 / p. 45)
- In the blank line “file &dir”, enter the name: C:\AWS\Service\extract(3/Fig. 9 / p. 45)
- Click add after each entry(4/Fig. 9 / p. 45).

The new file or path selection is now visible in the files & directories list box.

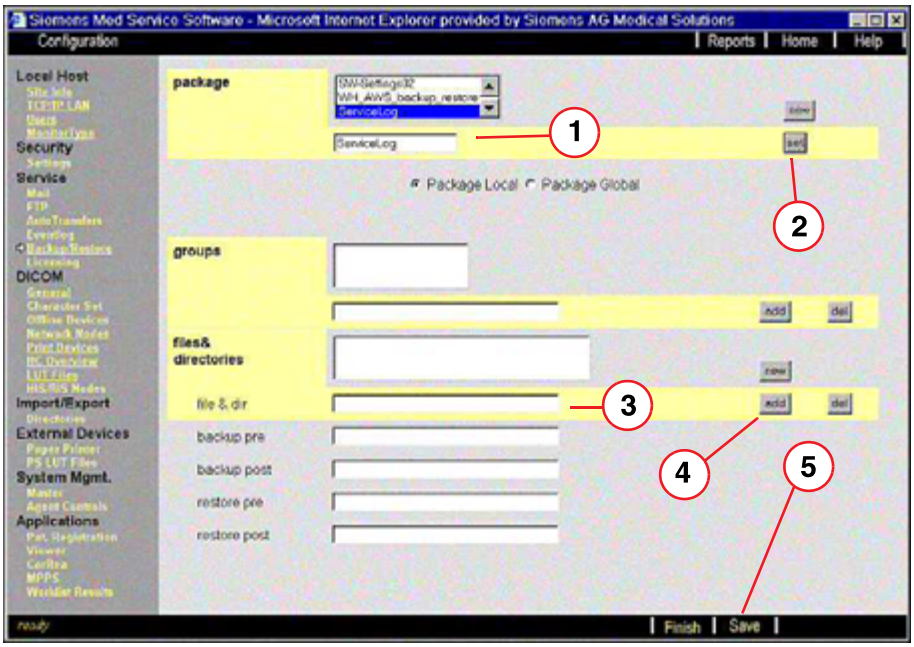


Fig. 9: Backup Package

- Click save(5/Fig. 9 / p. 45).

Back up your created package to CD.

- Select Local Service/Backup & Restore.
- Under Command: select Backup.
- Select the CD-R drive.
- Select your own created backup package: ServiceLogFiles.
- Click Go.

The backup process to CD will be started!

- After you have completed the backup, check your CD with the stored log files.

The configured ServiceLogFiles package is stored on CD compressed as file type “*.ar”. You can use the syngo arviewer.exe to read or extract these files. For more information, contact CS HSC 24 or your local USC.

SW Version VA11x

These instructions describe extracting log files for WH AWS with SW VA11x.

Copy MPxxxx files (detector files), dump files and syngo logs

These files have to be copied to a defined folder to ensure a correct copy on the CD.

Work steps

- The syngo AWS application is running.
- Select **Service** and **Local Service** in the menu bar under **Options**

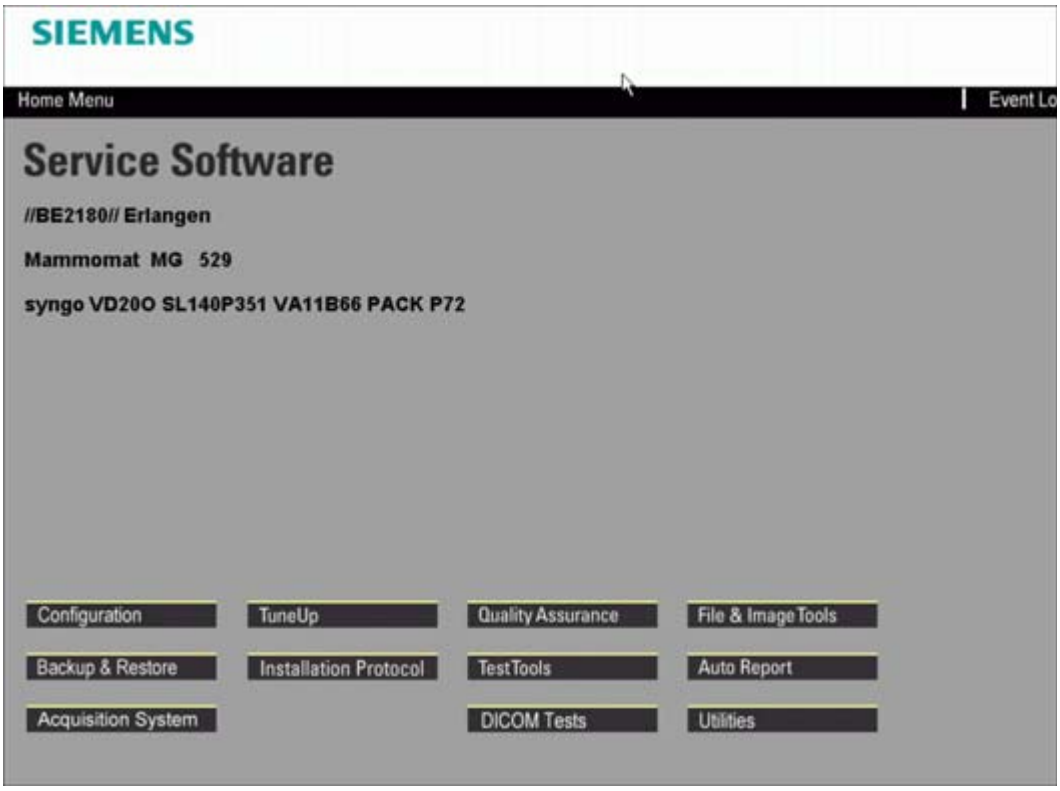


Fig. 10:

- Enter the service key and press **OK**. The Home menu appears.
- Select **Utilities**
- Select **Escape to OS**
- Enter **start explorer** under parameters

  Command: **NT command Interpreter**

  Parameters: **start explorer**

- Press the enter key.

- Windows Explorer opens.

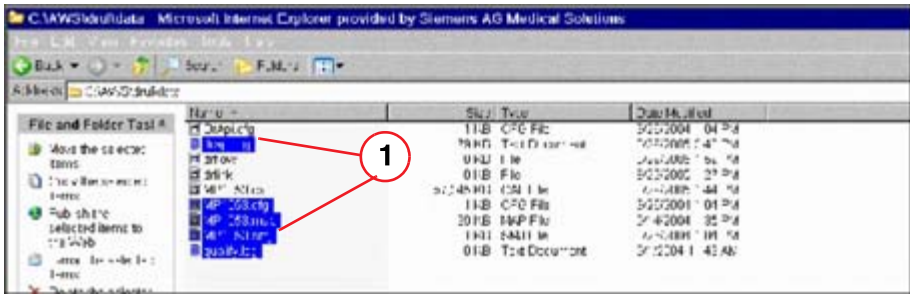


Fig. 11: Detector files

- Under **C:\AWS\drul\data**, select the files **Drapi.log, MPxxxx.cfg, qualify.log, MPxxxx.map** and **MPxxxx.smj**,(1/Fig. 11 / p. 47)right-click, and copy and paste to folder **C:\AWS\service\html\whaws\extract.**
- Select **C:\winnt\minidump*.dmp** (if available), right-click, and copy and paste to folder **C:\AWS\Service\html\whaws\extract**.
- Under **C:\AWS\log** , select all files (*.*), right-click them and copy and paste them to folder **C:\AWS\Service\html\whaws\extract.**
- Close Explorer.
- Select **Home**
- Close the Service software window

The storage files will be written onto CD by burning the SaveLogs files.

Copy Array and Brick log files

Use the Brick Configuration feature to display these files.

Work steps

Array files

- The syngo AWS application is running.
- Select **Service** and **Local Service** in the menu bar under **Options**
- Enter the service key and press **OK**. The Home menu appears.

- Select the **Acquisition System** button.

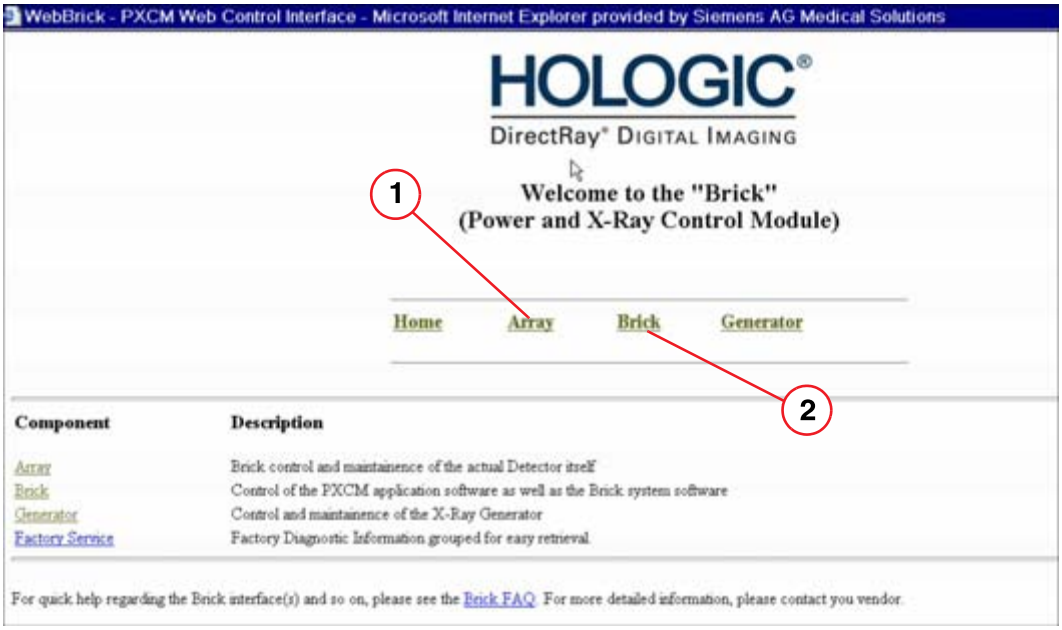


Fig. 12: PXCM Web Control Interface

- Select **Brick Configuration**(1/Fig. 18 / p. 54)
- Select **array**(1/Fig. 12 / p. 48)
- Select **Log File(s)**

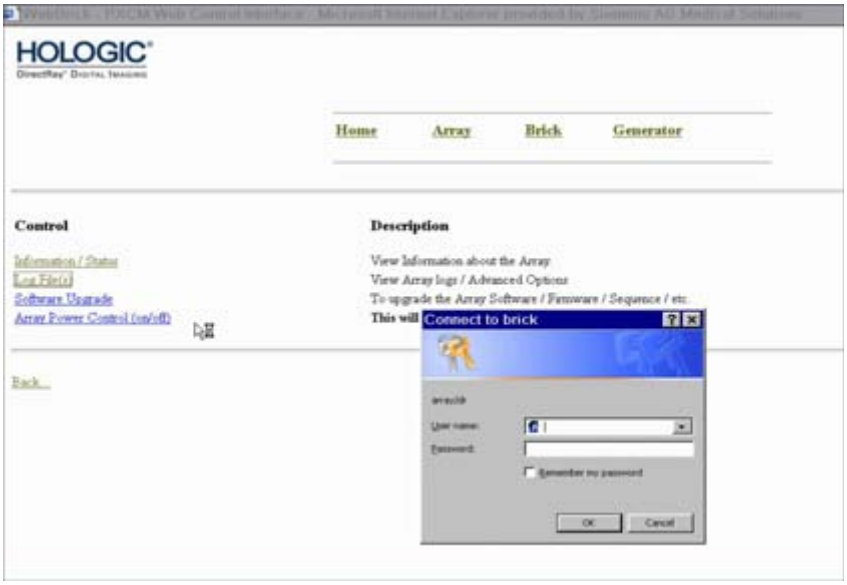


Fig. 13:

- The user name and appropriate password have to be entered(Fig. 13 / p. 48)

Login: root

Password: ***

- Press **OK**

- Select **All Log Files**

Fig. 14:

- Right-click **syslog** and select **Save Target As** (Fig. 14 / p. 49)
- Save the file as **array_syslog** in the directory C:\AWS\Service\html\whaws\extract.
- Right-click **syslog.0** and select **Save Target As** .
- Save the file as **array_syslog.0** in the directory C:\AWS\Service\html\whaws\extract.
- **Brick files**
- Select **Brick**
- Select **Log File(s)**
- The user name and appropriate password have to be entered

  Login: root

  Password: ***

- Press **OK**
- Select **All Log Files**
- Right-click **syslog** and select **Save Target As**
- Save the file as **brick_syslog** in the directory C:\AWS\Service\html\whaws\extract.
- Right-click **syslog.0** and select **Save Target As**
- Save the file as **brick_syslog.0** in the directory C:\AWS\Service\html\whaws\extract**.**
- Close the Web Brick window.
- Select **Home** in the Service software

- Copied files will be written by burning the SaveLogs to CD

Windows Eventlog

Work steps

- The syngo AWS application is running.
- Select **Service** and **Local Service** in the menu bar under **Options**

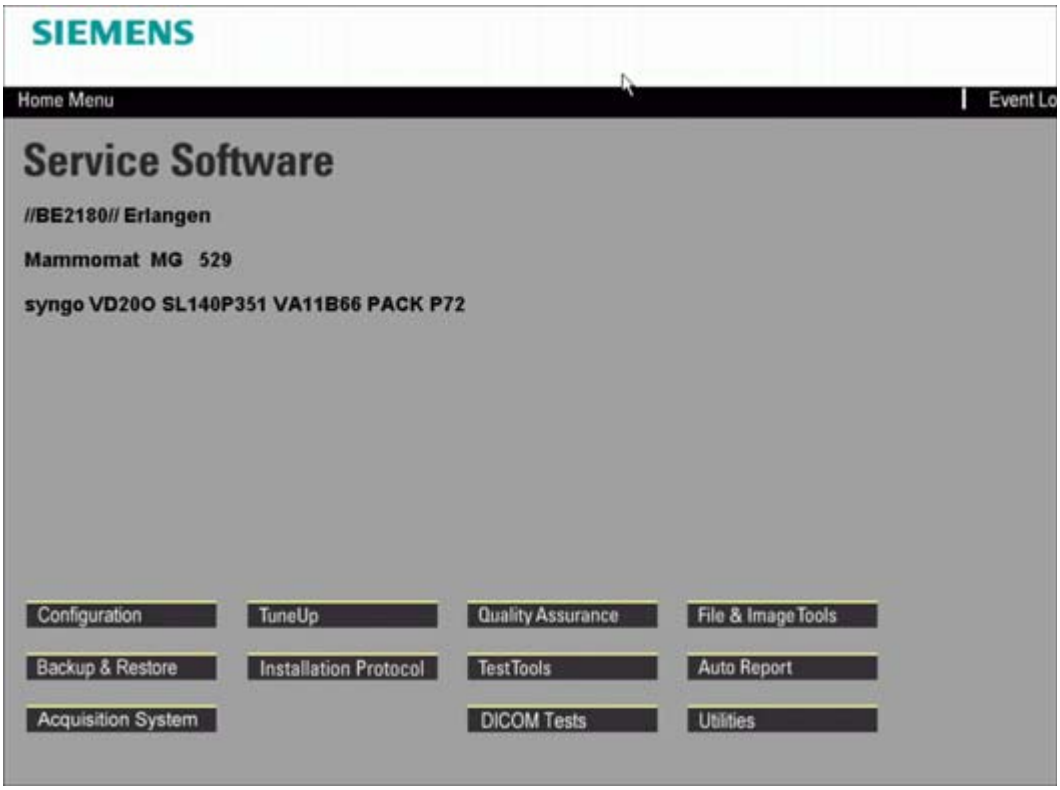


Fig. 15:

- Enter the service key and press **OK**. The Home menu appears.

- Select **EventLog** on the right upper edge of the menu bar.

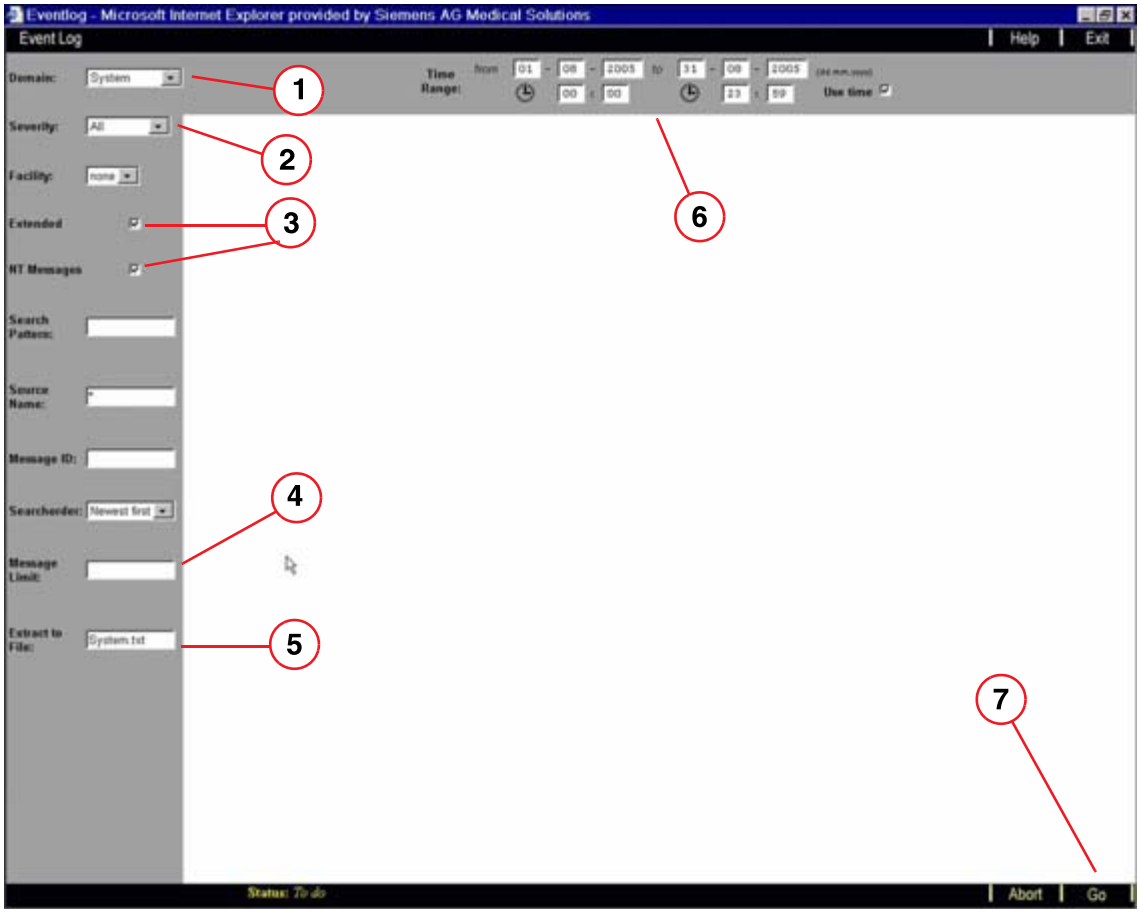


Fig. 16: EventLog_System

- Select the following parameters as shown in (Fig. 16 / p. 51) .

  Domain: **System**(1/Fig. 16 / p. 51)

  Severity: **All**(2/Fig. 16 / p. 51)

  Extended: selected(3/Fig. 16 / p. 51)

  NT Message: selected(3/Fig. 16 / p. 51)

  Message limit: empty(4/Fig. 16 / p. 51)

  Extract to file: **System.txt** ((5/Fig. 16 / p. 51)

  Time range: last month (e.g.: from dd_mm_yyyy to dd_mm_yyyy (actual date)).(6/Fig. 16 / p. 51)

  Select **GO**.(7/Fig. 16 / p. 51)

- The log file appears.

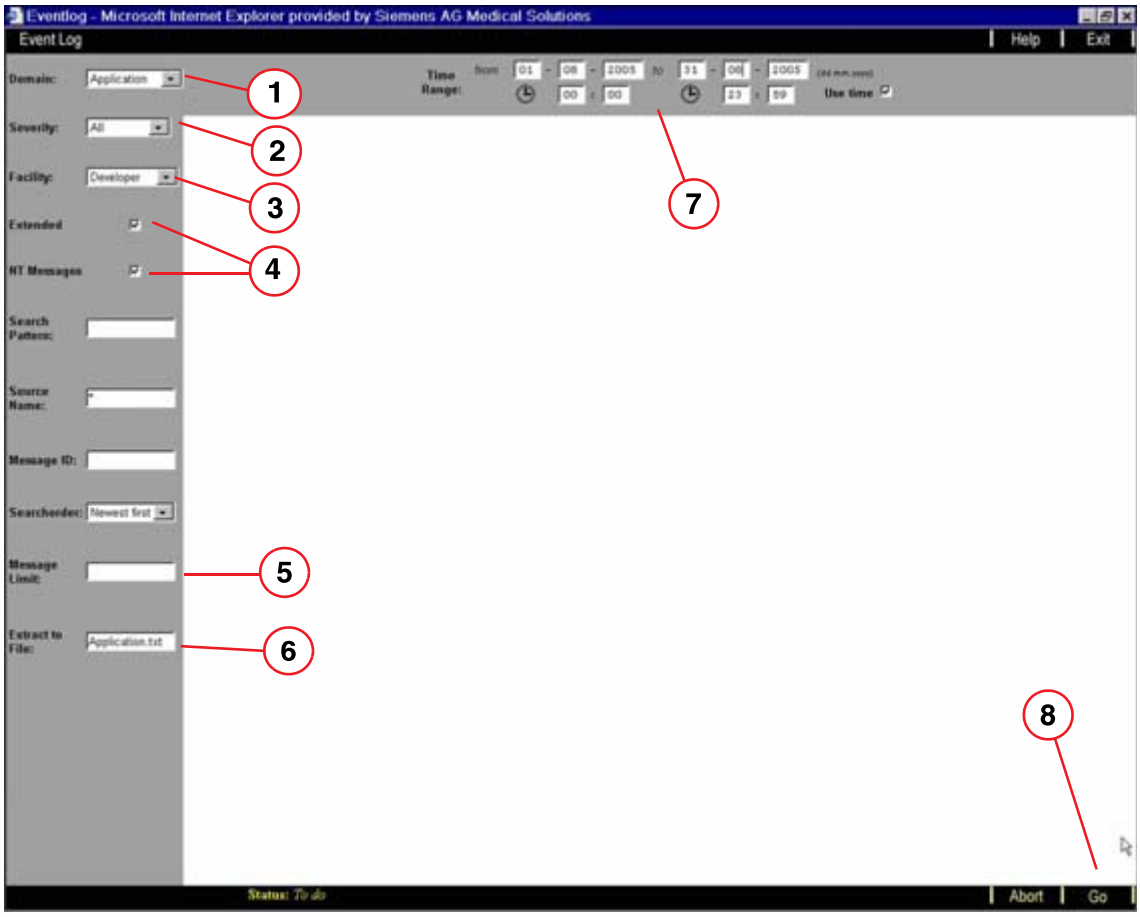


Fig. 17: EventLog_Application

- Select the following parameters as shown in (Fig. 17 / p. 52) .

  Domain: **Application**(1/Fig. 17 / p. 52)

  Severity: **All**(2/Fig. 17 / p. 52)

  Facility: **Developer**(3/Fig. 17 / p. 52)

  Extended: selected(4/Fig. 17 / p. 52)

  NT Message: selected(4/Fig. 17 / p. 52)

  Message limit: empty(5/Fig. 17 / p. 52)

  Extract to file: **Application.txt**(6/Fig. 17 / p. 52)

  Time range: last month (e.g.: from dd_mm_yyyy to dd_mm_yyyy (actual date))(7/Fig. 17 / p. 52)

  Select **GO**.(8/Fig. 17 / p. 52)

- The log file appears.

- Under **C:\AWS\Service\extract**, select the files **Date.txt** (e.g.:mm_dd_yyyy.txt) and **Application.txt** and copy and paste them to folder **C:\AWS\Service\html\whaws\extract**

Brickspy.tar.gz file

Use telnet to start a script.

- Select **Service** and **Local Service** in the menu bar under **Options**
- Select **Utilities**
- Select **Escape to OS**
- Enter **start telnet brick** under parameters

  Login: **root** (and press enter)

  Password: **brick** (and press enter)
- From the brick# command prompt, execute the following command:

  brickspy all (use lowercase letters and press enter)
- Wait until the script is finished and enter **Exit** (and press enter)

Use ftp to get the saved file.

- Select **Service** and **Local Service** in the menu bar under **Options**
- Select **Utilities**
- Select **Escape to OS**
- Enter **start cmd** under parameters
- At the DOS prompt, enter **cd C:\AWS\Service\html\whaws\extract** (and press enter)
- At c:\temp, enter **ftp brick** (and press enter)
- User: **ftp** (and press enter)
- Password: a random e-mail address, e.g., **test@siemens.com**
- At the ftp prompt, enter **bin** (and press enter)
- Enter **prompt** (and press enter)
- Enter **cd tmp** (and press enter)
- Enter **dir** (and press enter)

  The file **brickspy.tar.gz** will be displayed
- Enter **mget brick*** (and press enter)
- After the file has been transferred, enter **quit** to exit ftp.
- The file brickspy.tar.gz can be found on WH AWS under C:\Temp.

Copy SaveLogs

This feature is implemented on the WH AWS starting with SW VA11x and can be used if necessary.

Work steps:

- Select **Service** and **Local Service** in the menu bar under **Options**

- Enter the service key and press **OK**. The Home menu appears.

Fig. 18: Acquisition system

- Select the **Acquisition System** button.
- Click the **Extract AWS Savelog** button (2/Fig. 18 / p. 54).

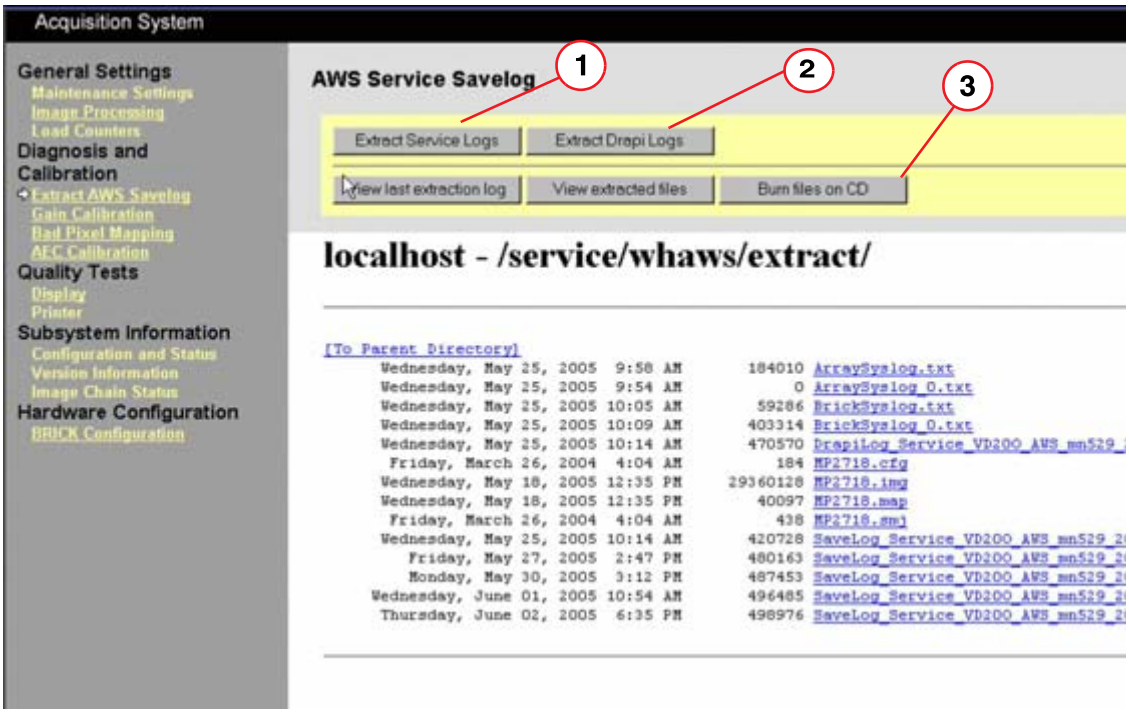


Fig. 19:

- The following mask appears: Extract Servicelog, Extract Drapi.logs, Burn files on CD, etc.
- Click **Extract Service Logs** (1/Fig. 19 / p. 54)
- Within seconds, the extracted files are shown.
- Click **Extract Drapilogs** (2/Fig. 19 / p. 54)
- Within seconds, the extracted files are shown.
- Insert an empty CD into the CD writer.
- Click **Burn files on CD** (3/Fig. 19 / p. 54).

- The following message appears: "Insert a blank CD into the CD-Writer and press OK or press Cancel to abort“
- Press **OK**
- After the burn procedure, the CD is ejected automatically..

If artifacts are visible in some images, these images (row data and processed data) can be stored on a second CD for explicit fact-finding in the factory.

Make a test image as described below:

Test images

- Install the compression plate simulator; make sure that the collimator is open to its full size
- Install the collimator-mounted plexi phantom; make sure no other object is in the radiation field
- Select the "QC-RAW" technique
- Take an image with 28kV and AEC
- Save the image to the CD

General

The generator section of the Mammomat Novation is of modular construction. The modules were developed so that, in general, no settings need be made when they are replaced. If an error occurs in the generator (radiation generation), different signals can be measured or checked in order to delineate or to localize the error.

Documents required

Service Software, SPB7-250.816.03...

Wiring Diagrams, SPB7-250.844.01...

Troubleshooting tips

Failure	Check	Measures to be taken if not OK
Control panel not working at switch-on	LEDs: “+5VD, -15 V, +15 V and 28Vprim on mains input converter	If all LEDs are off, check if there is input voltage at the input terminals and if S700 is ON. If there is voltage and S700 is ON, then the mains input converter is probably defective and must be replaced. Remember to switch off the input voltage before disconnecting this unit. If only one or some of the LEDs are off, switch off S700 and disconnect the cables from X700, X701, X705 and X706. If the LEDs still are off when you switch on S700, then the mains input converter is probably defective and must be replaced. Remember to switch off the input voltage before disconnecting this unit. If all LEDs are on when you switch on S 700, then the problem cable has to be identified. If the cable connected to X 700 is causing the failure, then the problem is either the HV inverter or the tube power supply. If the failure remains after the cable to connector X720 on the tube power supply has been disconnected, the tube power supply is probably defective and must be replaced. If the failure disappears after the cable to connector X720 has been disconnected, then the HV inverter is probably defective and must be replaced. If the cable connected to X701 is causing the failure, then the master board is probably defective and must be replaced. If the cable connected to X706 is causing the failure, then the problem is either the AC inverter or the tube power supply. If the cable to connector X723 on the tube power supply is disconnected and the failure remains, then the AC inverter is probably defective and must be replaced. If the failure disappears after the cable to connector X723 has been disconnected, then the tube power supply is probably defective and must be replaced. Attention: connectors X706 and X723 and related cables are galvanic and connected to mains voltage.
Control panel not working at switch-on	LED “DC_BUS_OK” on mains input converter	If neither LED “DC_BUS_OK” or LED “DC_BUS_FAILURE” is lit, there is probably no signal from the master board to the mains input converter or from the control panel to master board. If LED “DC_BUS_FAILURE” is lit, then the mains input converter is probably defective and must be replaced. Remember to switch off the input voltage before disconnecting this unit.

Failure	Check	Measures to be taken if not OK
Control panel not working at switch-on	LED “400VDC live H3”	If LED H4 is lit but not “H3”, fuse F2 in the mains input converter is probably defective. Switch off the mains to the input, wait until LED “H4” is off, then remove the mains input converter and replace fuse F2. Put back the unit and connect the cables but before switching on the the mains; remove the cable from connector X712 on the AC inverter. Switch on the mains and the control panel and check if LED “H3” is lit. If it is lit, switch off the mains to the input, wait until LED “H4” is off, then reattach the cable to X712 on the AC inverter. Switch on the mains and the control panel. If “H3” is still off, the AC inverter and fuse F2 have to be replaced. But remember to wait until “H4” is off before disconnecting cables. If “H3” is off in the first place, the tube power supply is probably defective and and must be replaced along with fuse F2. But remember to wait until “H4” is off before disconnecting cables.
Control panel not working at switch-on	LED “AC ON” on AC inverter	The AC inverter is probably defective and must be replaced. If “AC ON” is OK, the failure must be located in the stand electrical devices.

Signals on D750

The actual values of the generator can be measured on board D750 or checked with the aid of the Mammomat Novation, Software System, SPB7-250.816.03 service program. Refer to software system Main menu-Normal mode->Actual values.

Measurement points on board D750 are shown in following picture:

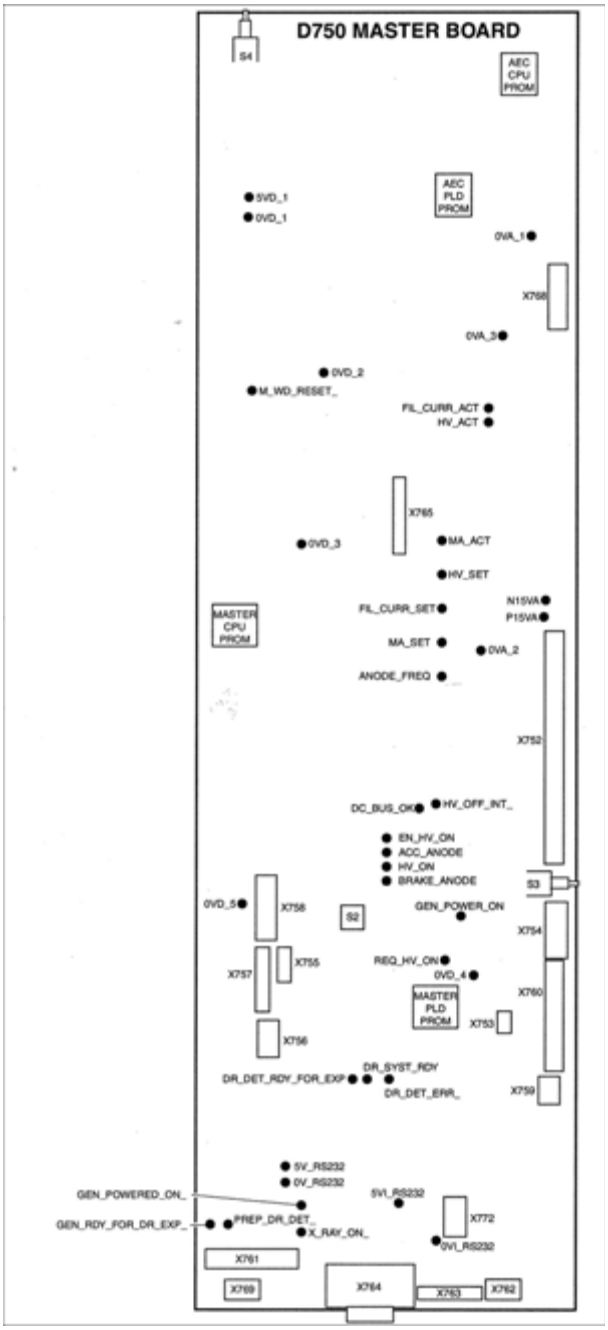


Fig. 20: D750

Test point	Description	Status
5VD_1	Logic supply voltage: 5 volt digital	
0VD_1,2,3,4,5	Logic supply voltage: 0 volt digital	
P15VA	Logic supply voltage: Positive 15 volt analog	
0VA_1,2,3	Logic supply voltage: 0 volt analog	
N15VA	Logic supply voltage: Negative 15 volt analog	
5V_RS232	Logic supply voltage: 5 volt; for communication with PXCM unit (Brick unit)	
0V_RS232	Logic supply voltage: 0 volt; for communication with PXCM unit (Brick unit)	
5VI_RS232	Logic supply voltage: 5 volt; for communication with service PC, Opdima WS and printer	
0VI_RS232	Logic supply voltage: 0 volt; for communication with service PC, Opdima WS and printer	
M_WD_RESET_	Signal that resets the master CPU and causes the entire Mammomat system to restart.	
GEN_POWER_ON	Signal to the generator that turns on the generator and the Mammomat system.	
DC_BUS_OK	Signal from the generator that indicates the DC-bus voltage is within its allowed voltage window.	
HV_OFF_INT_	Indicates that the signal M_PLD_HV_OFF_ from the PLD circuit has detected an event that will terminate or prevent high voltage generation. It causes the signal HV_ON from the master board to go inactive, which immediately prohibits high voltage generation.	
REQ_HV_ON	Signal from PLD and CPU that generates high voltage and thus starts the exposure. Together with the signal GRID_O_HV_ON, it sets the signal HV_ON.	
HV_ON	Signal set by the signals REQ_HV_ON and GRID_O_HV_ON that are output to the generator. One of two necessary signals, together with the signal EN_HV_ON, that generates high voltage and thus starts the exposure.	
EN_HV_ON	Signal from the exposure release buttons at the control panel to the generator. One of two necessary signals, together with the signal HV_ON, to generate high voltage and thus start the exposure.	

Test point	Description	Status
GEN_POWERED_ ON	Signal to the PXCM unit (Brick unit) that the power to the Mammomat system has been switched on by the operator.	0 V <=> OK
PREP_DR_DET_	Signal to the PXCM unit (Brick unit). The positive edge indicates to the Brick that the generator preparation phase to perform an exposure has started and requests that the DR detector prepare for image acquisition. The negative edge of the signal comes 5 ms after the negative edge of the signal GEN_RDY_FOR_DR_EXP at normal exposure termination; if the hardware detects an error, the negative edge of the signals will coincide. If a tube arc occurs, the signal will not go inactive.	4.3 V <=> Standby 0 V <=> Acquisition
GEN_RDY_FOR_ DR_EXP	Signal to the PXCM unit (Brick unit). The generator preparation phase has finished and the generator is ready to generate high voltage to the tube (i.e., X-ray). The inactivation of the signal will coincide with the negative edge of the signal X_RAY_ON at normal termination of the exposure. If the exposure terminates abnormally, the inactivation of the signal coincides with the inactivation of signal PREP_DR_DET. If a tube arc occurs, the signal will not go inactive.	4.3 V <=> Standby 0 V Acquisition ON
X_RAY_ON	Signal to the PXCM unit (Brick unit). The exposure is in progress. Note: The signal stays active - at the grid turning points when X-ray is actually off. - at the first two tube arcs when X-ray is actually off.	4.3 V <=> Standby 0 V <=> X-ray ON
DR_DET_RDY_F OR_EXP	The DR detector is acquiring image data.	5 V <=> Acquisition ON
DR_SYST_RDY	The DROC of the DR system indicates that it is ready for an exposure.	5 V <=> OK 0 V <=>Not ready
DR_DET_ERR_	The DR system indicates to the generator that it has detected an error.	0 V <=> OK 5 V <=>Error

Tube high voltage, current and mAs values

This section describes how to check the X-Ray tube in regard to the:

High voltage, tube current, mAs value with and without AEC and with a small or large focus.

These values can be checked by measuring HV_ACT/MA_ACT on board D750 and/or by using the service PC -> SW -> Normal -> Actual values. Only one of them is necessary, but both methods are described in the following.

Preparation

- Switch the system OFF (e.g., S700 on main input)
- Connect the oscilloscope as follows:

  Channel 1 to measurement point HV_ACT (1V=5 kV) on D750

  Channel 2 to measurement point MA_ACT (1V= 40 mA) on D750.
- Connect the service PC to the stand.
- Switch the system ON.
- Start the Service program and check in the **anode menu** whether the tungsten anode is enabled.
- In the Service program, select **Normal->Main menu ->Normal mode->Actual values**

Measurement method

The mAs value must be calculated as the product of the tube current and exposure time. The tube current and the exposure time can be obtained from the oscillograms. The diagram may have glitches, in which case you have to measure the exposure time t1 and t2.

Example:

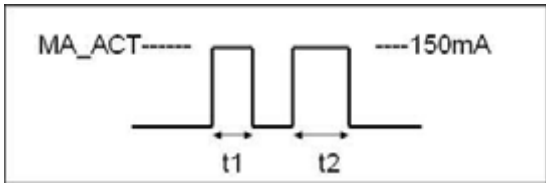


Fig. 21:

In the figure, the tube current is 150 mA and the exposure time is t1+t2 in seconds.

The mAs is 150mA*(t1+t2)

NOTE

Be aware that with the AEC mode on, a pre-exposure of 50 ms is done.

Select the correct trigger on the scope so you get the pre-exposure and all the exposure times.

The following oscillograms and values should be of assistance to you in troubleshooting the high-voltage circuit or radiation release.

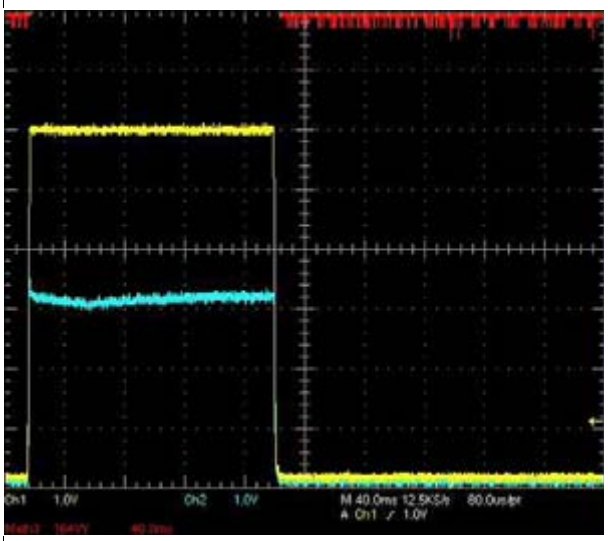
Checks with a large focus and without AEC

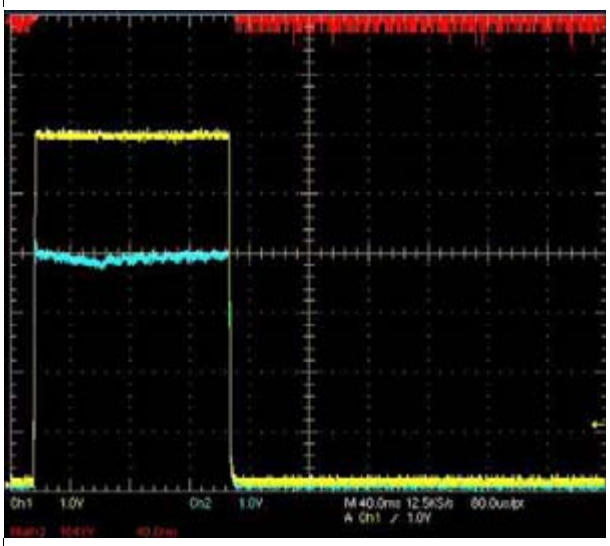
Prerequisites

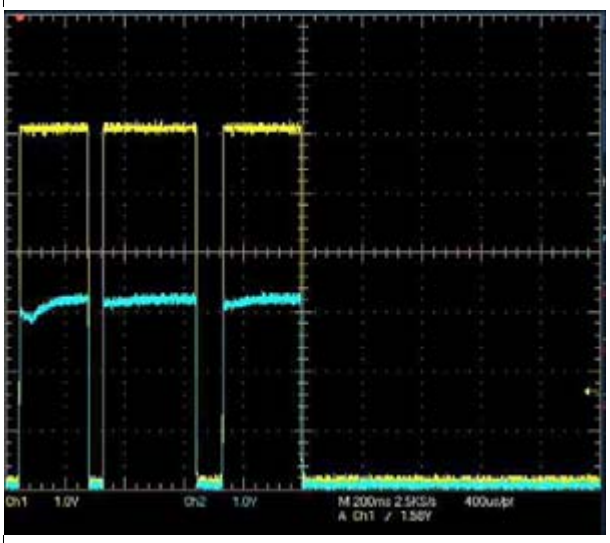
- Deselect D and H on the control console; the Mammomat is in mAs mode without AEC.
- Make sure the magnification table is removed so that a large focus is selected.
- The check can be performed for each measurement of the table.

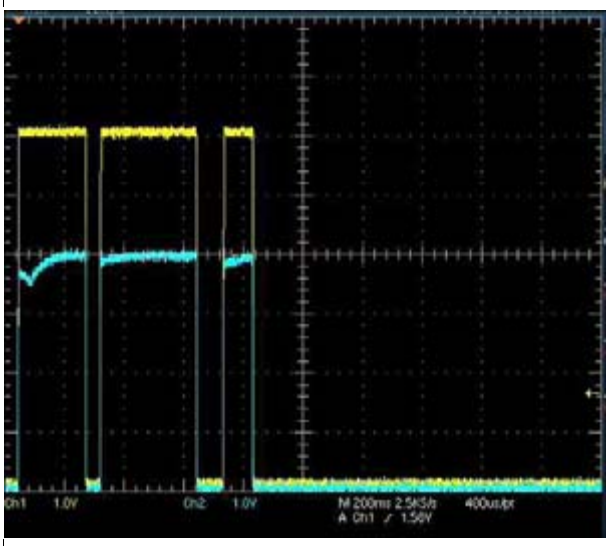
Measurement	kV	mAs	Anode/Filter
1	30	20	Mo/Mo
2	30	20	W/Rh
3	30	100	Mo/Mo
4	30	100	W/Rh

- Select the Examination tab card and load a patient for examination
- Set the exposure values on the control console according to the table above.
- Start an exposure.
- Check and compare the values with the following diagrams.
- The accuracy of the kV is +/- 5%, for tube current +/- 10% and for mAs product +/- 10%.

30 kV 20mAs Mo/Mo large focus	Values
 *Fig. 22: 30 kV 20 mAs MoMo large*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 120 mA 1V/T(1T<=> 40 mA) 40 ms/T **Service->Normal->Act. values** Act. tube current 118 mA Act. exp. time 170 ms

30 kV 20mAS W/Rh large focus	Values
 *Fig. 23: 30 kV 20 mAs W large*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 150 mA 1V/T (1T<=>40 mA) 40 ms/T **Service->Normal->Act. values** Act. tube current 148 mA Act. exp. time 140 ms

30 kV 100mAs Mo/Mo large focus	Values
 *Fig. 24: 30 kV 100 mAs MoMo large*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 120 mA 1V/T(1T<=> 40 mA) 200 ms/T **Service->Normal->Act. values** Act. tube current 118 mA Act. exp. time 950 ms

30 kV 100mAs W/Rh large focus	Values
 *Fig. 25: 30 kV 100 mAs W large*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 150 mA 1V/T(1T<=> 40 mA) 200 ms/T **Service->Normal->Act. values** Act. tube current 148 mA Act. exp. time 790 ms

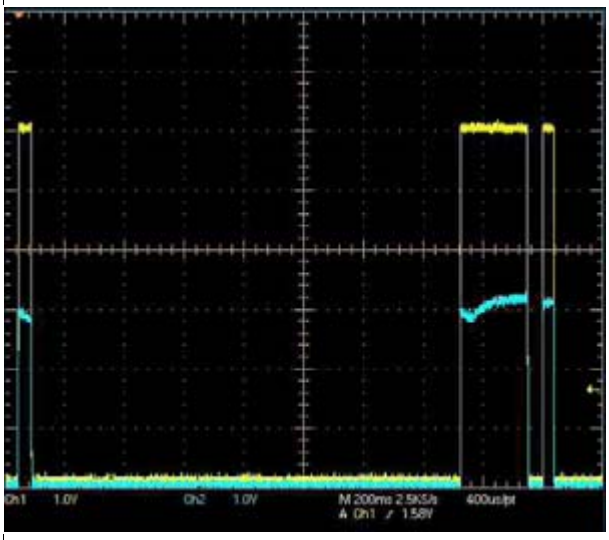
Checks with a large focus and with AEC

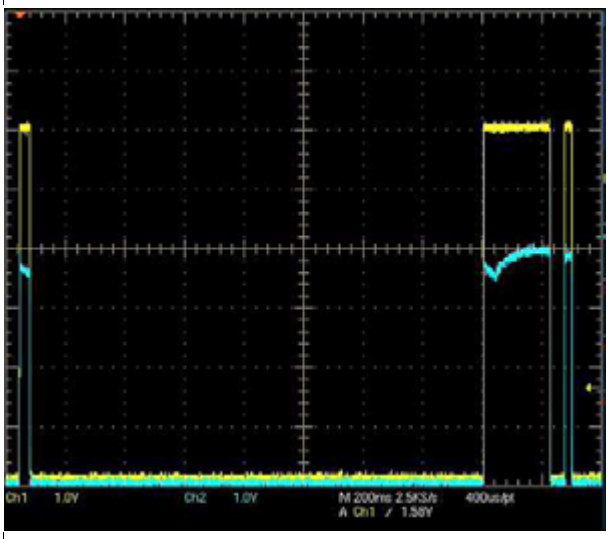
Prerequisites

- Mount the collimator-mounted plexi phantom
- Register a patient
- Make sure the magnification table is removed so that a large focus is selected.
- Select H on the control console; the Mammomat is now in AEC mode.
- The check can be performed for each measurement of the table.

Measurement	kV	mAs	Anode/Filter
1	30	--	Mo/Mo
2	30	--	W/Rh

- Adjust the exposure values on the control console according to the table above.
- Start an exposure.
- Check and compare the values with the following diagrams.
- The accuracy of the kV is +/- 5%, for tube current +/- 10% and for mAs product +/- 10%.

30 kV AEC Mo/Mo large focus	Values
 *Fig. 26: 30 kV AEC MoMo large*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 120 mA 1V/T(1T<=> 40 mA) 200 ms/T **Service->Normal->Act. values** Act. tube current 118 mA Act. exp. time 360 ms

30 kV AEC W/Rh large focus	Values
 *Fig. 27: 30 kV AEC W large*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 150 mA 1V/T(1T<=> 40 mA) 200 ms/T **Service->Normal->Act. values** Act. tube current 148 mA Act. exp. time 330 ms

Checks with a small focus

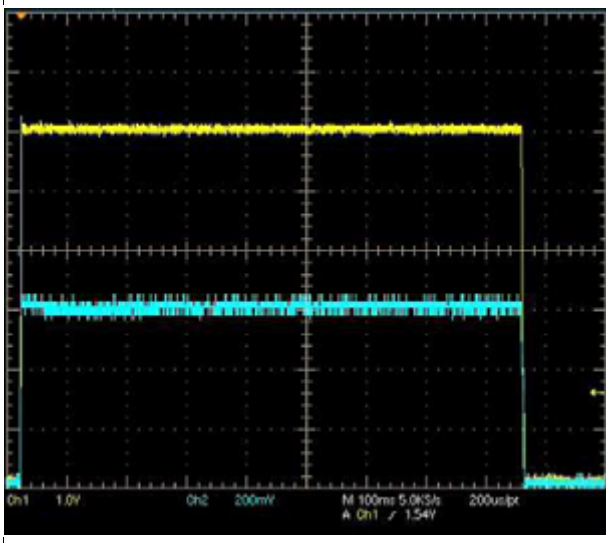
NOTE

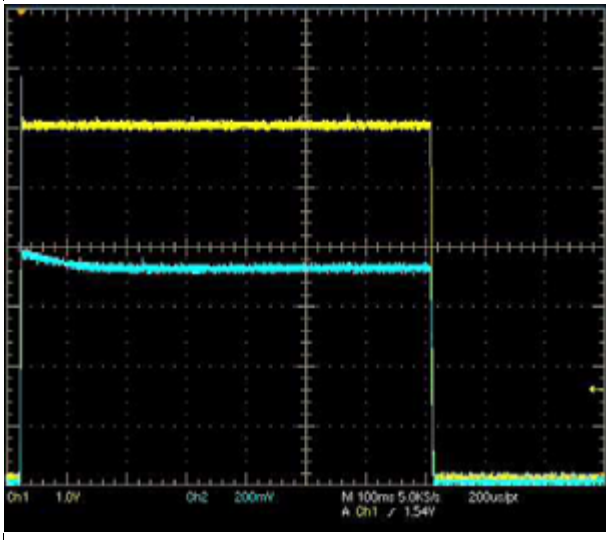
These checks are possible only when a magnification table is available. Select the small focus. The magnification table is needed. This table is a option.

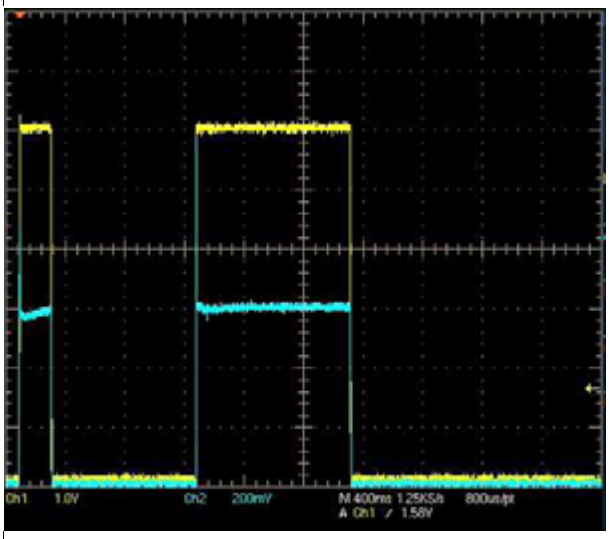
Prerequisites

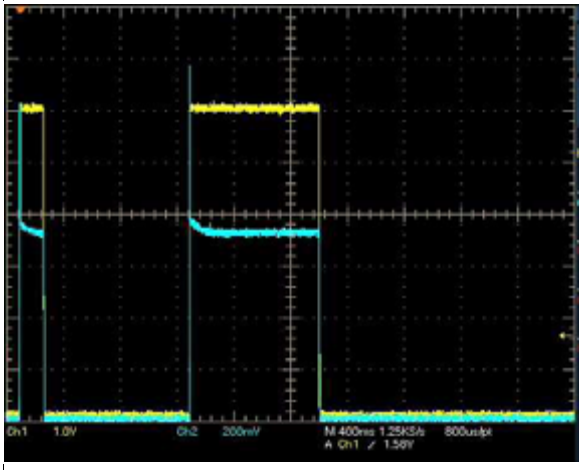
- Make sure the magnification table is mounted so that a small focus is selected.
- Set the exposure values on the control console according to the table below.
- Start an exposure.
- Check and compare the values with the following diagrams.
- The accuracy of the kV is +/- 5%, for tube current +/- 10% and for mAs product +/- 10%.

Measurement	kV	mAs	Anode/Filter
1	30	20	Mo/Mo
2	30	20	W/Rh
3	30	AEC	Mo/Mo
4	30	AEC	W/Rh

30 kV 20mAs Mo/Mo small focus	Values
 *Fig. 28: 30 kV 20 mAs MoMo small*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 24 mA 0.2V/T(1T<=> 8 mA) 825 ms 100 ms/T **Service->Normal->Act. values** Act. tube current 24 mA Act. exp. time 830 ms

30 kV 20mAs W/Rh small focus	Values
 *Fig. 29: 30 kV 20 mAs W small*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 30 mA 0.2V/T(1T<=> 8 mA) 680 ms 100 ms/T **Service->Normal->Act. values** Act. tube current 30 mA Act. exp. time 690 ms

30 kV AEC Mo/Mo small focus	Values
 *Fig. 30: 30 kV AEC MoMo small*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 24 mA 0.2V/T(1T<=> 8 mA) 400 ms/T **Service->Normal->Act. values** Act. tube current 24 mA Act. exp. time 1250 ms

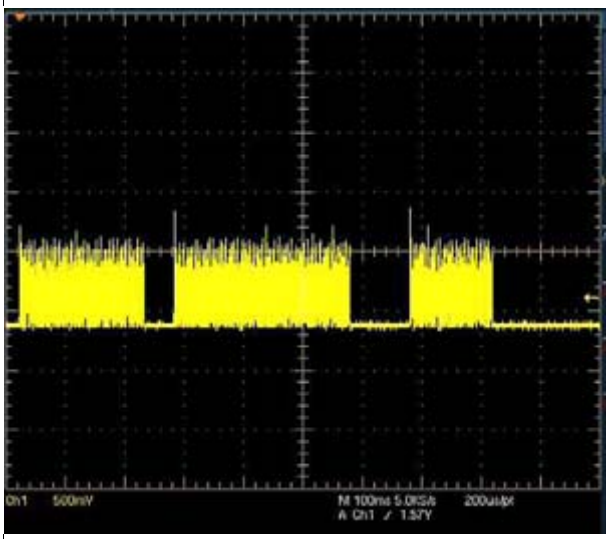
30 kV AEC W/Rh small focus	Values
 *Fig. 31: 30 kV AEC W small*	**D750 HV_ACT /mA_ACT** 30 kV 1V/T (1T<=> 5 kV) 30 mA 0.2V/T(1T<=> 8 mA) 400 ms/T **Service->Normal->Act. values** Act. tube current 30 mA Act. exp. time 1090 ms

If there is an error in the high-voltage circuit, one of the following components could be defective:

- X-ray tube
- HV tank
- HV inverter module
- AC inverter module

Inverter current

This is an analog signal proportional to the output inverter current fed to the HV tank.

I-OUT 30 kV 100mAs W/Rh large focus	Values
 *Fig. 32: I-out, 30 kV 100 mAs W large*	Module: HV inverter Measurement point I_OUT I-OUT 0.5 V/T 100 ms/T

If no signal can measured at I_OUT due to an error, then one of the following components could be defective:

- X-ray tube
- HV tank
- HV inverter
- Mains input converter

Filament circuit

The Service SW, software system, is used for setting the filament current values.

Work steps

- Connect the Service PC.
- Start the SW.
- Turn the system **ON**.
- Select **Main menu->Configuration->Filament**.

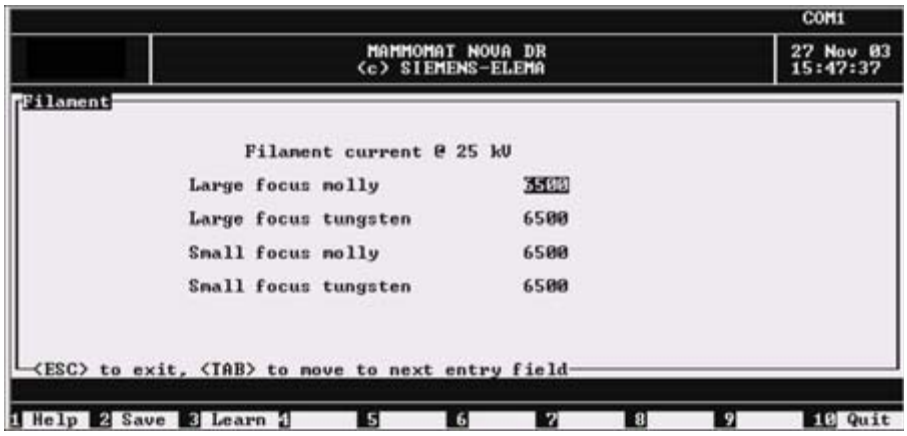


Fig. 33: Filament

Indicates the adapted filament current of available anode materials for large and small focus. Adaptation exposures for the filament current are also made in this menu. Pressing F3 sets the exposure parameters on the control panel, and subsequently pressing Alt-F6 starts the exposure. Repeat this procedure until the tube current deviation is within ±5%. If the tube has been replaced, program the filament current value to be 200 mA less than the value stated in the test certificate as a pre-adjustment. (e.g., if tube value is 6900, program 6700.)

If a new filament current has been entered, you must save the new value (press F2) before learn filament is performed.

NOTE

The Dynamic Learn Filament may change this adjustment. But the DLF will learn only when the exposure time is longer than 60 ms.

Fig. 34: Miscellaneous, DLF switch

Activation and deactivation of the filament current adaptation. When activated, the adaptation takes place after a total of ten exposures have been made with the actual focus, if the deviation of the average value from the nominal value is not within -15% to + 5%.

NOTE

Filament adaptations are possible only when the detector wing is selected. "dr" is displayed on the control panel.

Test points on D750

The filament current values can also be measured on board D750.

FIL_CURR_SET Analog output signal to the generator for setting the magnitude of the filament current. The relation between the filament current and the analog control signal is1A/V.

FIL_CURR_ACT Analog input signal FIL_CURR_ACT, from the generator, that is proportional to the true filament current. The relation between the filament current and the analog signal is 1A/V.

Independent of the selected focus, the current value is **3.5 A** (At test point D750 FIL_CURR_ACT = 3.5 V).

During preparation or exposure, the value is increased to approx. **6.6 A** to **6.9 A** according to selected focus.

If no filament current is present, there could be an error on one of the following components:

- X-ray tube
- Tube power module
- AC inverter module
- Cable between X-ray tube and tube power module

General

The detector system is an important component of the Mammomat Novation and is key to image quality. There are 2 detector calibration procedures that should be used if image artifacts (pixel failures, bad lines, etc.) occur.

- Gain calibration
- Bad pixel mapping

In case of image quality problems, defined test images and files are needed for analysis:

- MPXXXX.map, MPXXXX.cfg, quality.log, MPXXXX.smj
- Test image: 4 cm Plexi, 28 kV, AEC, QC Raw
- Calibration image

These images and files have to be supplied to USC/HSC for support.

Documents required

- Startup Instructions, SPB7-250.815....
- Rep. of parts, SPB7-250.841.01...
- Rep. of parts, SPB7-250.841.02..

Gain calibration

A gain calibration should be performed first. If the image artifacts persist, then perform bad pixel mapping.

Gain calibration

- Creates the offset for each pixel value.
- Filename:<Serial_Number>.map
- If there is no gain calibration file that matches the current array serial number, only calibration scans and service scans are allowed.

Furthermore, the gain calibration procedure must be performed weekly. This procedure can be performed by the customer or the service engineer.

For SW version VA10x, see the user manual.

Fig. 35: _select_calibration

Eight exposures (accepted) have to be taken.

Work steps for SW VA11x

- Select Examination->Calibration
- Select 28 kV and 250 mAs.
- Select the Anode/Filter combination the customer uses most frequently.
- Mount the collimator-mounted plexi phantom.
- Be sure that no additional objects are in the radiation field.

During the calibration procedure, an image can be seen on the monitor, shown in the following example:

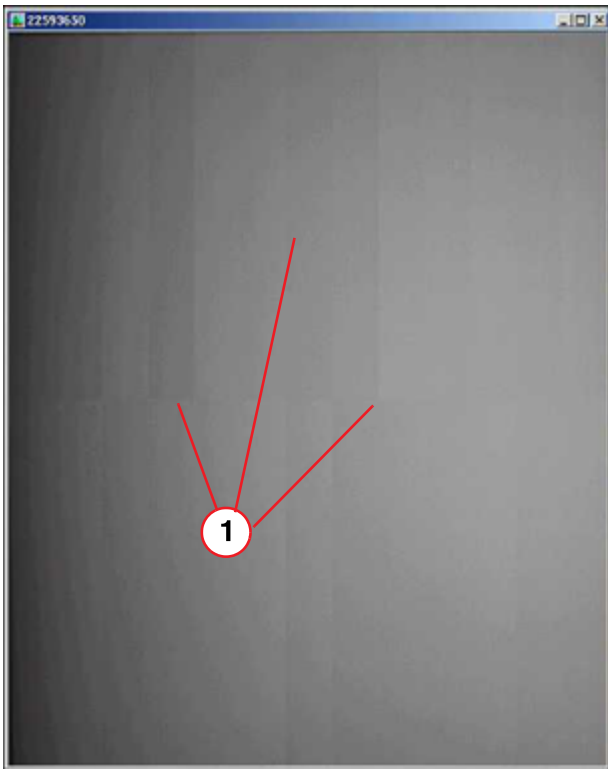


Fig. 36: Normal Calibration

This image is normal during the calibration and must not be interpreted as an error.

Bad pixel mapping

A new pixel map should be created if excessive pixel dropout occurs repeatedly on images displayed in the Examination tab card(Fig. 35 / p. 75). The procedure has to be performed by service and only when a defective line or pixel occurs.

Work steps

- Select Options -> Service -> Local Service
- Enter the service key and press OK.
- Select Acquisition System.
- Select Examination -> Calibration in the menu bar.
- Select Bad Pixel Mapping.
- Select 28 kV and 250 mAs.
- Select the Anode/Filter combination the customer uses most frequently.
- Insert the collimator-mounted plexi phantom.
- One exposure has to be performed.
- Be sure that no additional objects are in the radiation field.
- Once accepted, the defective line(s) or pixel(s) is/are not released again.

If the line/pixel is still visible after bad pixel mapping calibration, try to lower the mAs value by 50 mAs, e.g., 200 mAs.

NOTE	**Bad pixel mapping cannot be repeated without restoring the old mapping files. Bad pixel mapping is a continuous procedure. Bad results remain in the mapping file. There is no undo procedure. Contact the Uptime Support Center.**
NOTE	**The bad pixel mapping procedure cannot be performed until the detector has been powered on for at least one hour to allow it to warm up.**
NOTE	**To go back, the original mapping files from the supplied detector-specific CD must be loaded.**
NOTE	**Bad pixels after bad pixel mapping can result from an incorrect adjustment of the collimator setting or wrong X-ray tube settings. In case of bad pixel(s), also check the collimator adjustment and X-ray tube settings.**

Qualify log

Description

An important file of the detector system for image quality is the qualify.log. This provides information about possible pixel failures in the detector. After every bad pixel mapping, this file is overwritten with the current data of the detector. This includes possible pixel failures, bad areas or defective lines.

The qualify.log can be found in folder C:\AWS\drul\data or using the Service SW, Home->Acquisition System->Bad Pixel Mapping.

Images defects in the raw, uncorrected image inside the imageable area must meet the following performance criteria:

- Not to exceed a total of 2936 defective pixels exclusively or dead lines which correspond to 0.02% of the total amount of pixels.
- Have zero 3x3 pixel areas containing more than 8 defective pixels
- Have zero 5x5 pixel areas containing more than 15 defective pixels.
- Not to exceed a total number of 80 pixel clusters (2x2) where all 4 pixels are defective.
- Not to exceed a total number 20 defective lines.
- Have zero adjacent defective lines (e.g., two defective lines must be separated by at the least one good line)

The following examples show qualify logs for good and defective detectors:

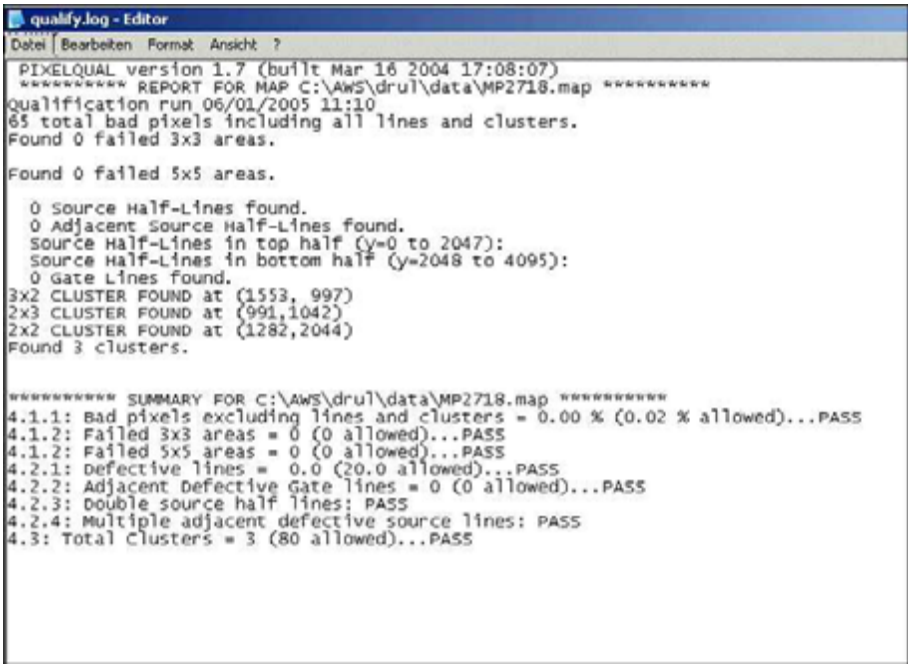


Fig. 37: Qualify.log

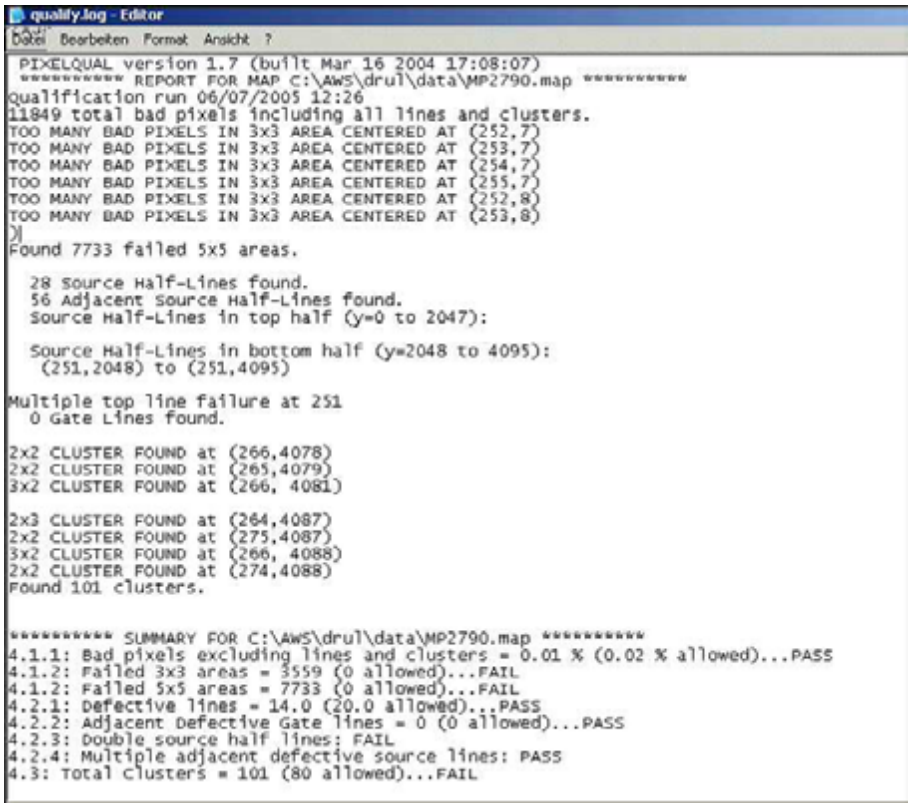
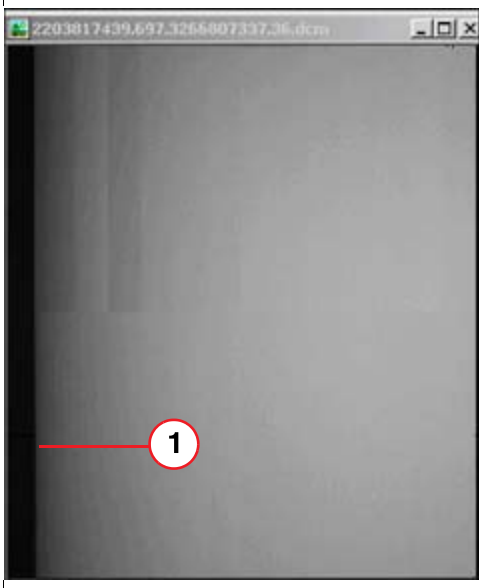
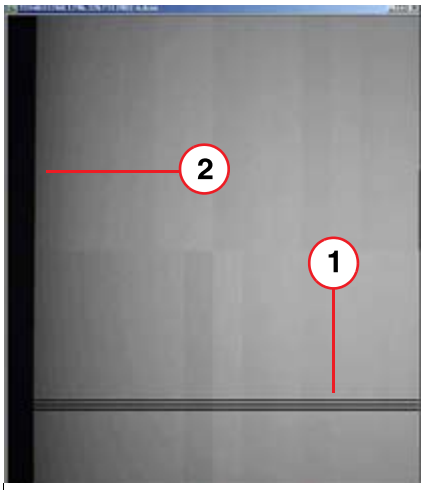


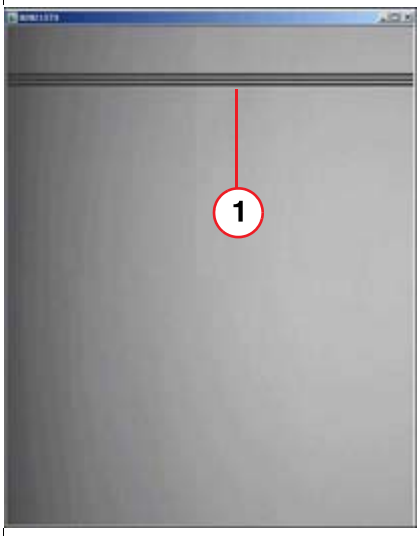
Fig. 38: Bad qualify.log

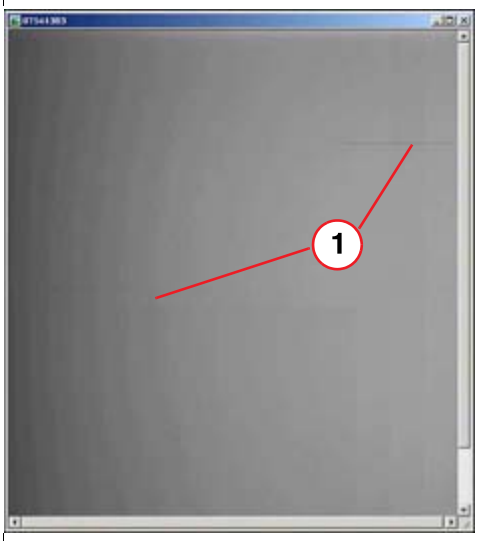
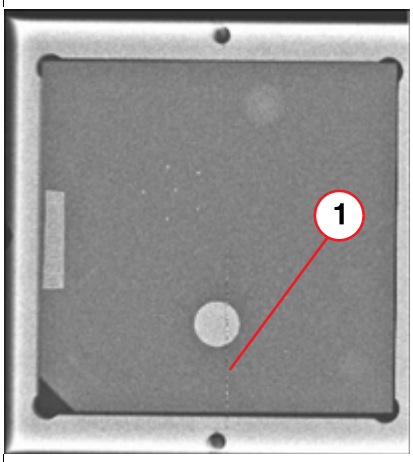
If the check is not successful (fails) and most dropouts are at the image edges, check the collimator adjustment. Refer to Collimator Adjustment, System Startup, SPB7-250.815.05...

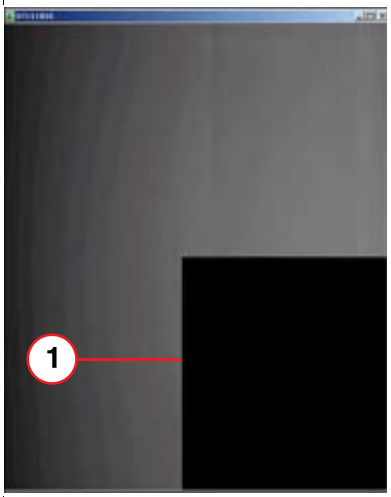
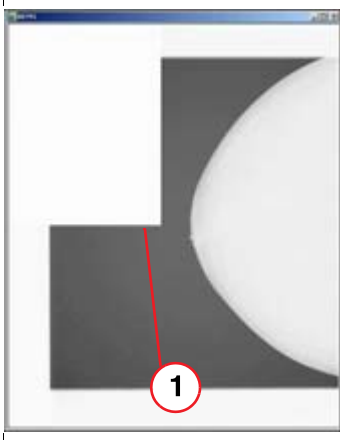
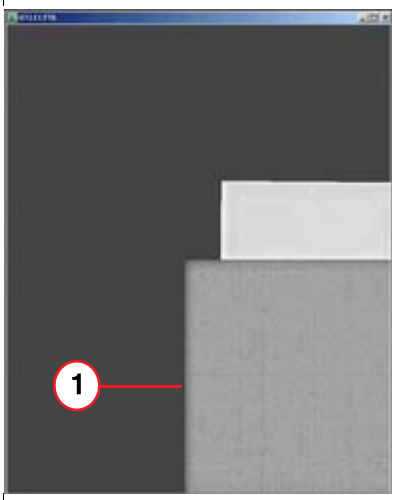
Image examples

The following image examples show different effects that can occur on the Mammomat Novation. If one of these effects or artifacts can be seen, perform a gain calibration and, if required, bad pixel mapping. For grid stripes, check the mechanical grid settings. In some image examples, the details cannot be recognized quite accurately (pixel failures, grid stripes). The online version (HTML version) of this document shows higher perceptibility compared to the printed version. Should the recommended measures be unsuccessful, then contact USC/HSC. The detector may need to be replaced.

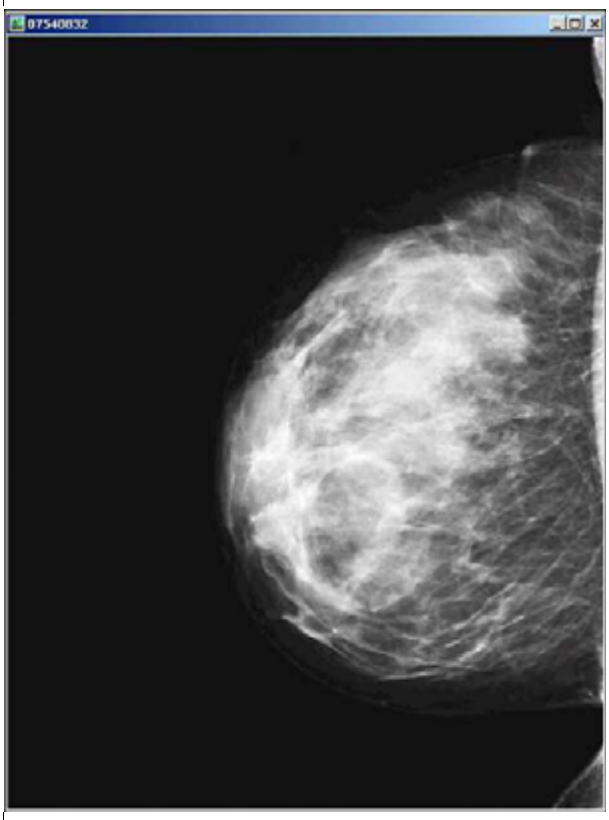
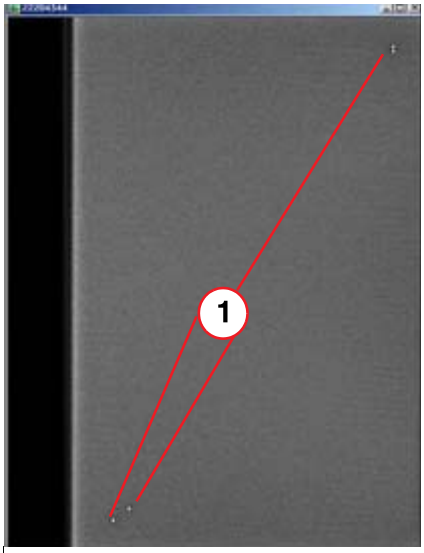
Collimator problems	Description	Actions
 *Fig. 39: Bad collimator*	Shadow on the chest wall side	Perform collimator adjustment according to Startup Instructions, SPB7-250.815... Collimator Adjustment chapter.
 *Fig. 40: Bad line 1 cm*	1. Bad line 2. Shadow on chest wall side	1. Perform gain calibration procedure Perform bad pixel mapping correction. 2. Perform collimator adjustment according to Startup Instructions, SPB7-250.815... Collimator Adjustment chapter.

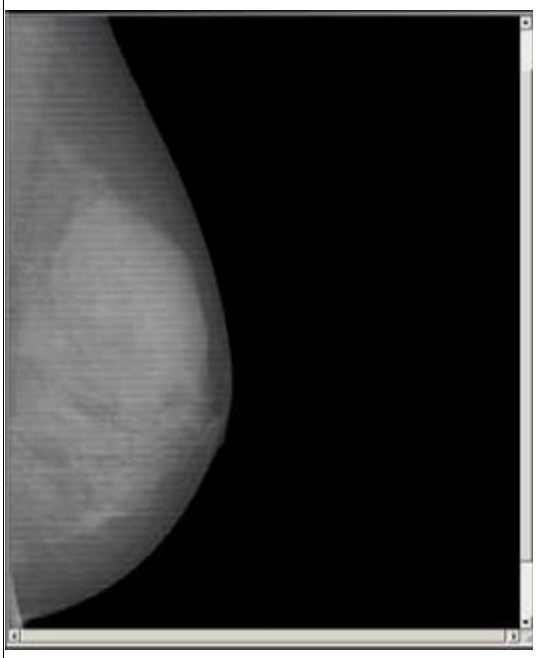
Line problems	Description	Actions
 *Fig. 41: Bad line 1 cm*	1 cm line (1)	Perform gain calibration procedure. If not successful, perform bad pixel mapping correction. If not successful, the detector may need to be replaced. Contact USC/HSC.

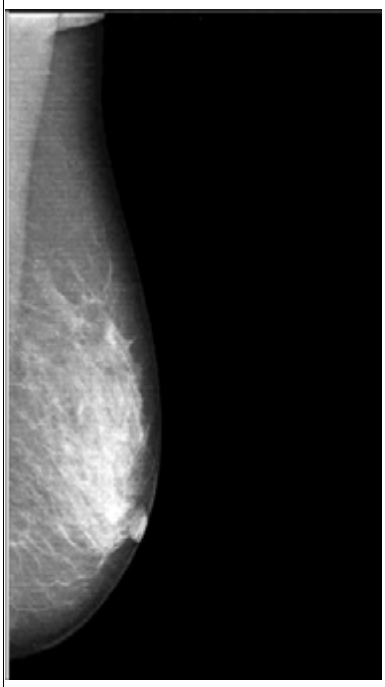
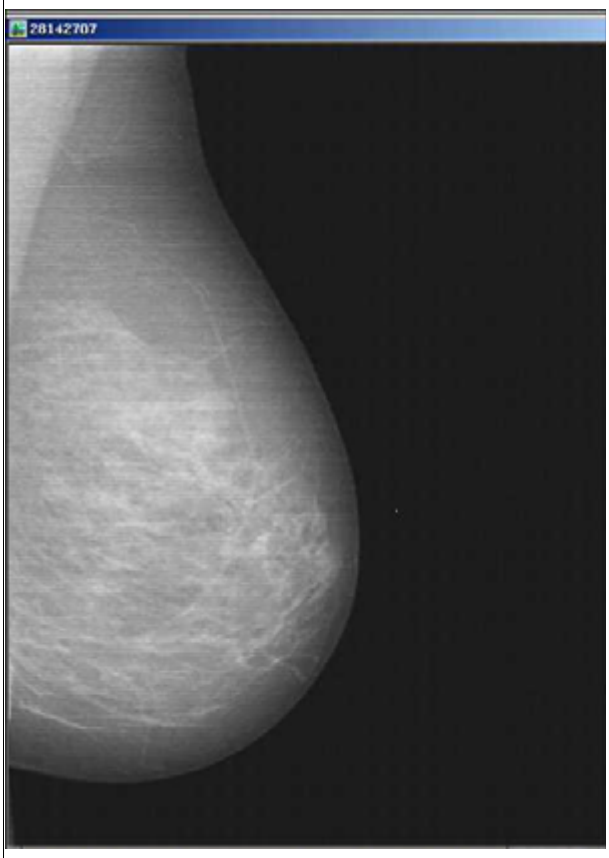
Line problems	Description	Actions
 *Fig. 42: Bad line 1 mm*	1 mm line (1)	Perform gain calibration procedure. If not successful, perform bad pixel mapping correction. If not successful, repeat bad pixel mapping with lower mAs values (e.g.: 200mAs). If not successful, the detector may need to be replaced. Contact USC/HSC.
 *Fig. 43: Bad line into RMI156*	Bad line (1)	Perform an exposure without the phantom and check whether the line(s) or bad pixels are located at the same position. If yes, perform the gain calibration procedure. If not successful, perform bad pixel mapping correction. If not successful, the detector may need to be replaced. Contact USC/HSC.

Quadrant failure	Description	Actions
 *Fig. 44: Quadrant failure 1*	Quarter panel defect (lower right side)	Restart the whole system If not successful, the detector may need to be replaced. Contact USC/HSC.
 *Fig. 45: Quadrant failure 4*	Quarter panel defect (upper left side)	Restart the whole system. If not successful, the detector may need to be replaced. Contact USC/HSC.
 *Fig. 46: Quadrant failure*	Quarter panel defect (lower right side)	Restart the whole system. If not successful, the detector may need to be replaced. Contact USC/HSC.

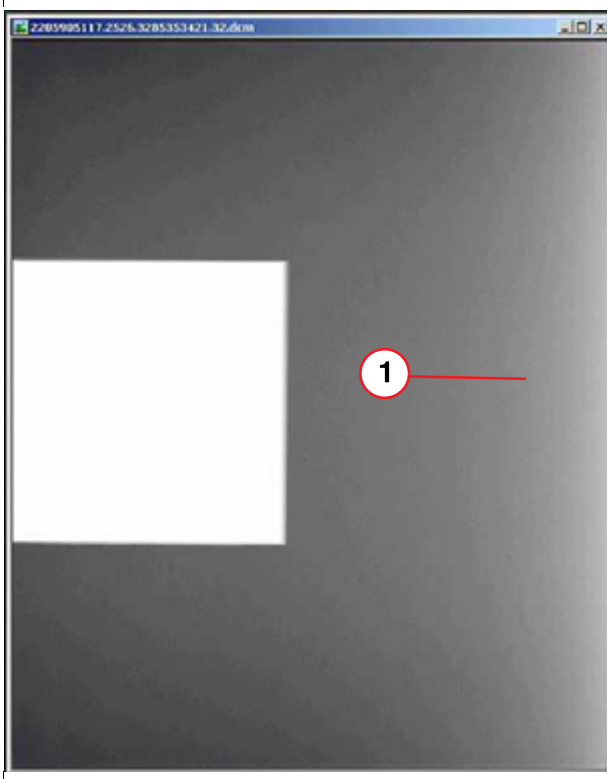
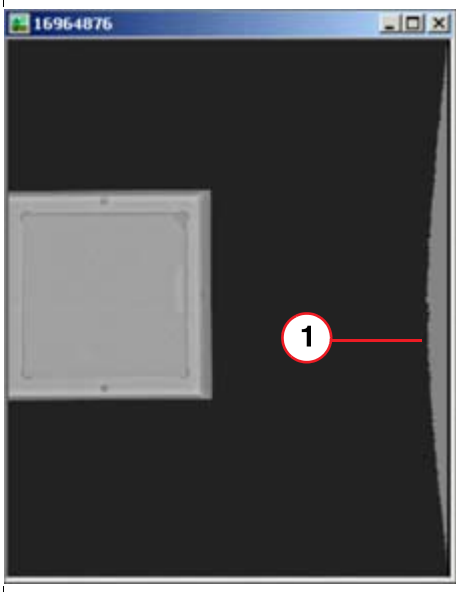
Problems during calibration	Description	Actions
 *Fig. 47: Bad lines during calibration*	Bad lines appear during calibration	After gain calibration, turn the whole system OFF. Turn the system ON and repeat the gain calibration.
 *Fig. 48: Bad lines during calibration*	Bad lines appear during calibration	After gain calibration, turn the whole system OFF. Turn the system ON and repeat the gain calibration.

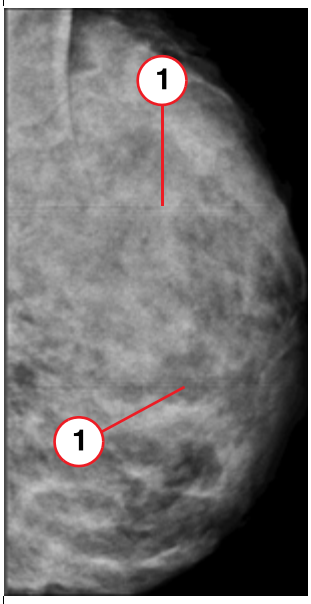
Pixel dropouts	Descrip-tion	Actions
 *Fig. 49: Bad pixel 1*	Defective pixels or lines on image	Perform an exposure without the phantom and check whether the line(s) or bad pixels are located at the same position. Perform gain calibra-tion procedure. If not successful, per-form bad pixel mapping correction. Check qualify.log file whether map file is within specification (pass). If not, the detector may need to be replaced. Contact USC/HSC.
 *Fig. 50: Pixel problem*	Defective pixels (1) on image	Perform an exposure without the phantom and check whether the line(s) or bad pixels are located at the same position. Perform gain calibra-tion procedure. If not successful, per-form bad pixel mapping correction. Check qualify.log file whether map file is within specification (pass). If not, the detector may need to be replaced. Contact USC/HSC.

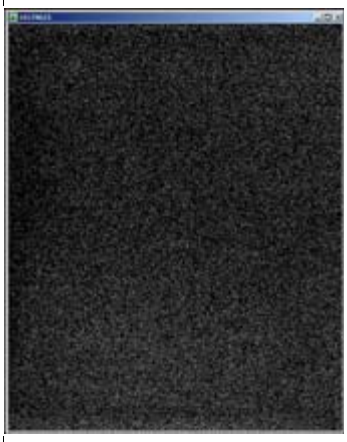
Grid lines	Description	Actions
 *Fig. 51: Raster6*	Grid lines are visible on image.	Check exposure parameters: If exposure time is very short (e.g.: pre-shot), grid lines can be visible on image. In this case, select the appropriate exposure parameters. To eliminate grid lines, check the grid adjustment according to the Startup Instructions, SPB7-250.815.., Chapter 9.: Adjusting the grid switch Adjusting the “wheel” Adjusting the grid location Adjusting the grid speed If not successful, refer to Replacement of Parts, SPB7-250.841.02.01.02.

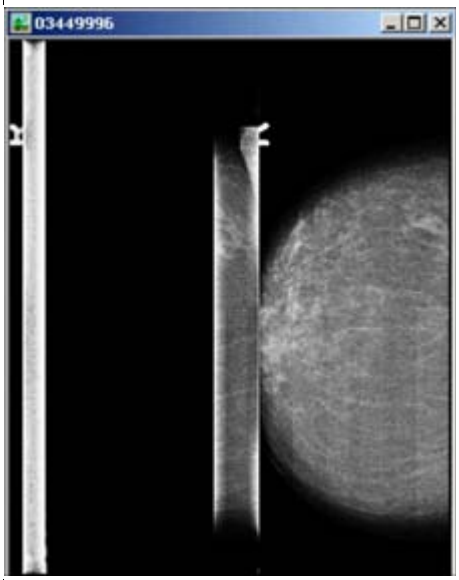
Grid lines	Description	Actions
 *Fig. 52: Raster8*	Grid lines are visible on image.	Check exposure parameters: If exposure time is very short (e.g.: pre-shot), grid lines can be visible on image. In this case, select the appropriate exposure parameters. To eliminate grid lines, check the grid adjustment according to the Startup Instructions, SPB7-250.815.., Chapter 9.: Adjusting the grid switch Adjusting the “wheel” Adjusting the grid location Adjusting the grid speed If not successful, refer to Replacement of Parts, SPB7-250.841.02.01.02.
 *Fig. 53: Raster5*	Grid lines are visible on image.	Check exposure parameters: If exposure time is very short (e.g.: pre-shot), grid lines can be visible on image. In this case, select the appropriate exposure parameters. To eliminate grid lines, check the grid adjustment according to the Startup Instructions, SPB7-250.815.., Chapter 9.: Adjusting the grid switch Adjusting the grid location Adjusting the grid speed If not successful, refer to Replacement of Parts, SPB7-250.841.02.01.02.

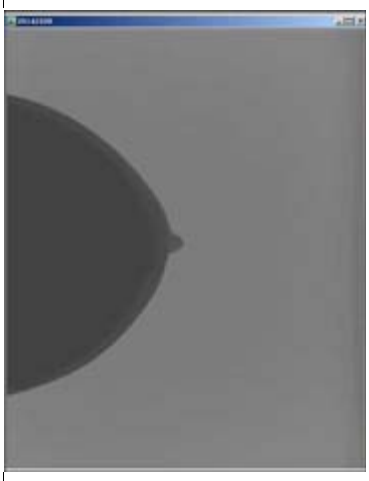
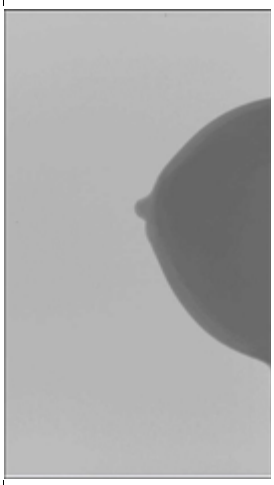
Bad paddle	Description	Actions
 *Fig. 54: Bad paddle*	Edge of compression paddle visible on image	Replace compression paddle Adjust the whole compression unit according to Replacement of Parts SPB7-250.841.01...

Heel effect	Description	Actions
 *Fig. 55: Heel effect*	Decrease of beam intensity to the stand side. Problems during “Bad Pixel Mapping”.	Perform an exposure with the other compression paddle. If not successful, check collimator adjustment. If not successful, the X-ray tube may need to be replaced. Contact USC/HSC.
 *Fig. 56:*	Decrease of beam intensity to the stand side.	Perform an exposure with the other compression paddle If not successful, check collimator adjustment. If not successful, the X-ray tube may need to be replaced. Contact USC/HSC.

Microphony	Description	Actions
 *Fig. 57: Raster7*	Lines and artifacts visible on image. Detector motions during acquisition of image data	Repeat image acquisition and be sure there is no motion during image data transfer. If successful, inform the customer about handling during data acquisition.
 *Fig. 58: Microphony*	Lines and artifacts visible on image. Detector motions during acquisition of image data	Repeat image acquisition and be sure there is no motion during image data transfer. If successful, inform the customer about handling during data acquisition.

Starry sky	Description	Actions
 *Fig. 59: Starry sky 1*	Many spots are visible on image	Reboot the whole system. If not successful, perform an exposure with the collimator-mounted plexi-phantom and QC-Raw. If not successful, perform gain calibration procedure. If not successful, perform bad pixel mapping correction. If not successful, the detector may need to be replaced. Contact USC/HSC.
 *Fig. 60: Starry sky 2*	Many spots are visible on image	Reboot the whole system. If not successful, perform an exposure with the collimator-mounted plexi-phantom and QC-Raw. If not successful, perform gain calibration procedure. If not successful, perform bad pixel mapping correction. If not successful, the detector may need to be replaced. Contact USC/HSC.

“Scrambled” Image	Description	Actions
 *Fig. 61:*	Image information “scrambled” on image.	Reboot the whole system (including Brick)

AEC/Dose problems	Description	Actions
 *Fig. 62: Bad exposure 2*	Dose for exposure too low, or acquisition aborted by user, or acquisition was terminated before exposure was completed.	Check exposure parameters. Exposure time probably too short Check generator values according to the Troubleshooting Guide, “Generator checks” chapter, (these instructions.)
 *Fig. 63: Bad exposure dose1*	Dose for exposure too low, or acquisition aborted by user, or acquisition was terminated before exposure was completed.	Check exposure parameters. Exposure time probably too short Check generator values according to the Troubleshooting Guide, “Generator checks” chapter, (these instructions.)

General

These instructions describe the work steps for troubleshooting the compression unit:

- Check the adjustments (see Replacement of Parts, SPB7-250.841.01..)
- Check the potentiometer R863 (Position transducer of the compression unit)
- Check the potentiometer R861 (compression force)
- Check the movements(up/down)
- Check the detection of the compression paddles

Documents required

- Replacement of Parts, SPB7-250.841.01..
- Wiring Diagrams, SPB7-250.844.01...
- Service SW Stand, SPB7-250.816.03..

Checks

Check the adjustments

For the compression unit to function properly, it is very important that it is adjusted according to the instructions described in Replacement of Parts, SPB7-250.841.01...

Check the potentiometer R863 (position transducer)

- Attach a compression paddle to the compression unit.
- Move the compression paddle up/down.

The display for thickness changes the values during movement.

- Place a defined object thickness onto the detector, e.g.: 40 mm Plexi-phantom.
- Move down the compression paddle by means of the foot switch until the paddle reaches the object on the detector.

The value on the thickness display (D803) has to be the same as the object thickness.

If not, adjust the compression unit according to Replacement of Parts, SPB7-250.841.01.. If the potentiometer still does not work properly after the adjustment, the potentiometer might be defective and need to be replaced.

Check the potentiometer R861 (compression force)

- Turn the potentiometer clockwise to a defined position, e.g.: 8 kp (see display on the lower position of stand).
- Place a scale with a digital display onto the detector and move down the compression paddle until the movement stops automatically.
- Read the force on the display of the scale. If a deviation >0.3 kp between the values occurs, perform a force adjustment according to Replacement of Parts, SPB7-250.841.01..

If adjustment is not possible, potentiometer R861 might be defective and need to be replaced or the compression unit is defective.

Check the movements (up/down)

- Press the compression pedals (up/down) for electrical movement of the compression paddle. The paddle moves up/down.

If electrical movement is not possible, check the power supply:

- Check 14 volt supply on board D802

If this voltage is not present, fuse F1 (5AT) on D805 or F803 might be defective or D805 is defective or motor of compression unit is defective.

Check the detection of compression paddle.

One condition for an exposure release is the detection of a compression paddle. This will occur by attaching the compression paddle in the guide shaft of the compression unit. The detection of compression paddles can be checked using the Service SW Stand, SPB7-250.816.03.. Chapter Service=>Stand test.

Work steps

- Connect service PC and start Service SW of stand, see Software System Stand, SPB7-250.250.816.03..

Fig. 64: Stand test paddleID

Select Main menu=>Service=>Stand test PaddleID

- Attach a compression paddle to the compression unit and start the test with the service SW.

A paddle ID will be shown on PC display.

- Repeat this procedure with each compression paddle.

A list with the corresponding PaddleID is shown below:

Compression plate	Art.no	Plate ID	Object Table
Comp. plate simulator	10048527	00	Detector
Comp. plate 20x22H	10048520	01	Detector
Comp. plate 20x22H (Flex)	10048521	02	Detector
Comp. plate 18x24 (High Edge)	10048519	03	Detector
Comp. plate 18x24 (Low Edge)	10048516	04	Detector
Comp. plate 18x24 (Flex)		05	Detector
Comp. plate 24x30 (High Edge)	10048515	06	Detector
Comp. plate 24x30 (Low Edge)	10048518	07	Detector
Comp. plate 24x30 (Flex)	10048517	08	Detector
Comp. plate Mag.1.5	10048522	09	Mag. Table 1.5
Comp. plate Mag. 1.8	10048523	10	Mag. Table 1.8

Compression plate	Art.no	Plate ID	Object Table
Comp. plate Spot 1.0	10048513	11	Detector
Comp. plate Spot 1.5	10048524	12	Mag. Table 1.5
Comp. plate Spot 1.8	10048525	13	Mag. Table 1.8
Shadow cross		14	Detector
Comp. plate Stereo	10048514	15	Stereo
Biopsy Hole Plate	10046676	04	Detector
No plate attached		99	Detector

If one of the paddles cannot be detected (ID 99), the paddle might be defective and need to be replaced.

If none of the paddles can be detected, a problem occurred on the compression unit or D805 or the ribbon cable between both:

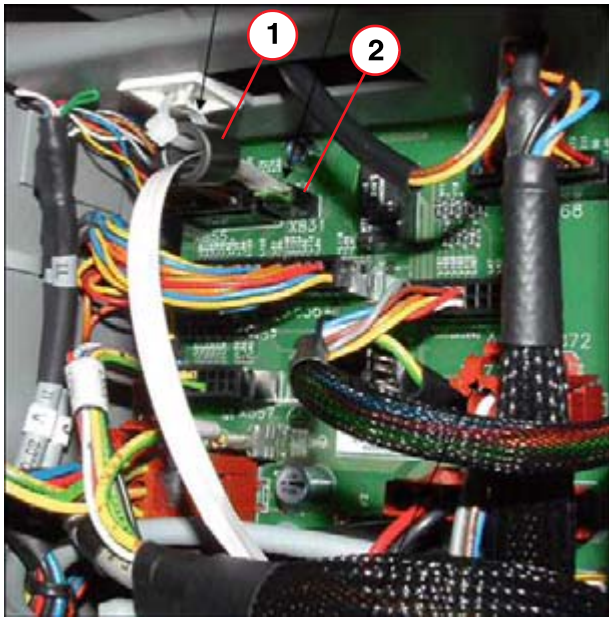


Fig. 65: D805

- Check the ribbon cable between guide shaft and D805 X831(1/Fig. 65 / p. 97). The connector on the ribbon cable (2/Fig. 65 / p. 97) has to be plugged in so that the "nose" on the connector (1/Fig. 66 / p. 98), and the pins are visible from above; they are on the upper side.

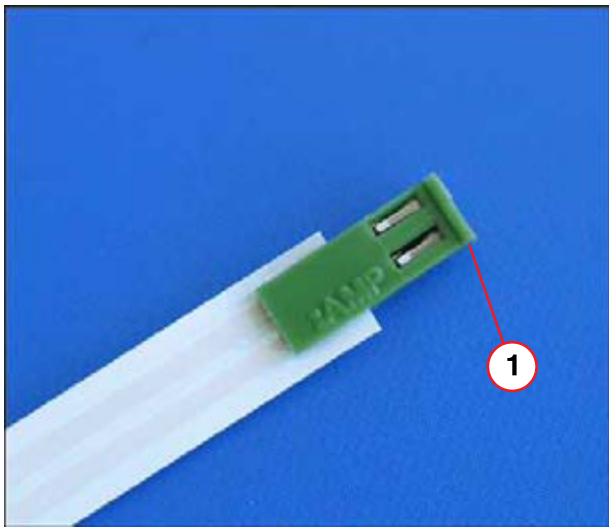
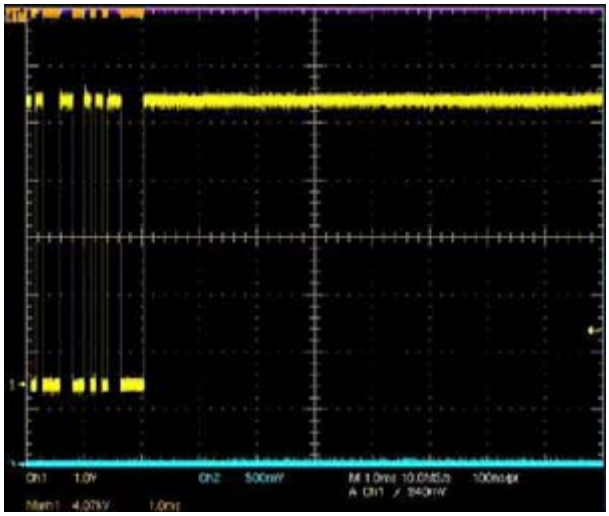


Fig. 66: X831

Measurement on D801

If none of the paddles can be detected, a pulse sequence can be checked at TP SMART_RX on D801:

- When no paddle is attached on the compression unit, a short pulse sequence can be measured (Fig. 67 / p. 98).



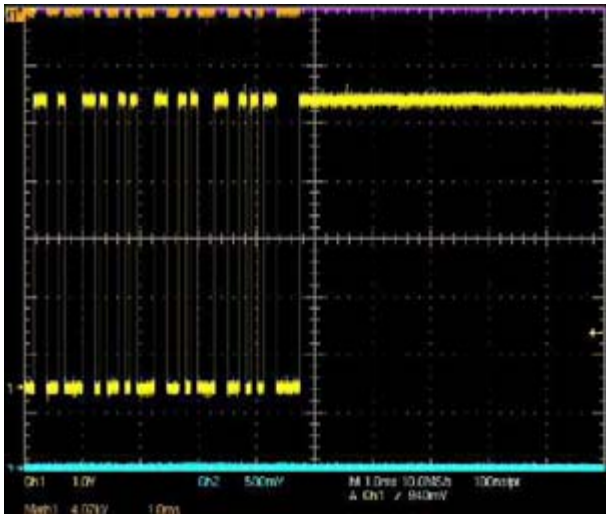
D801 TP SMART_RX

1 V/T

10 ms/T

Fig. 67: Pulse sequence without compression paddle

When a paddle is attached on the compression unit, a longer pulse sequence can be measured than without a paddle (Fig. 68 / p. 99)



D801 TP SMART_RX

1V/T

10 ms/T

Fig. 68: Pulse sequence with compression plate simulator

When no pulse sequence occurs, board D805 may be defective or there is a bad connection between the guide shaft (compression unit) and D805 (X831).

- Err 831 appears when connection D801 <=> is defective or J10 (D805) is defective.

Chapter	Page	Change
n.a.	n.a.	Initial version